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November-December 1954

METAL TREATING

MTI
MASTER CRAFTSMEN
METAL TREATING INSTITUTE

THE *Only* MAGAZINE DEVOTED EXCLUSIVELY TO THE HEAT TREATING INDUSTRY

CUT COSTS
with the
Fastest Carburizing
(AND CASE HARDENING)

PRODUCTION UP 350% IN 45% Less Floor Space!

Bearing races and thrust washers are carburized 0.065" case depth in 6 hours at 1700°F in two Ajax salt bath carburizing and tempering lines totaling 6 furnaces, and occupying 45% less space than 21 separate batch type furnaces previously used. Six men handle 3½ times as many races as were previously handled by twelve men.

Costs Cut 60%!

390 pounds of metal body screws per hour are case hardened (0.004" to 0.010") in a single Ajax salt bath furnace no larger than your desk. Bath working dimensions are 36" by 12" by 16". Only 15 to 35 minutes immersion at 1600°F are required — depending on desired case depth. Salt bath carburizing greatly reduced rejects and eliminated a pickling operation.

Tractor drive pinions are selectively carburized in this typical Ajax electric salt bath installation. By immersing only the gear in the bath, carburization is obtained where desired and the unheated portions remain unaffected.

Ajax electric salt bath liquid carburizing is the **fastest, most economical** method of producing a specified case depth.

Faster Heating . . . Closer Control—A closely controlled case of 0.040" can readily be produced in 2 hours at 1750°F.

Low Costs—*First cost is only 1/2 to 1/5 that of any other production carburizing system!* Much less floor is needed. Maintenance costs are low.

Less Distortion — Temperature uniformity (within 5°F) minimizes distortion . . . assures less finish grinding . . . permits more shallow case depths.

Extreme Flexibility and Simplicity—Several batches may be case hardened simultaneously —each to a different case depth.

Combines with Other Operations — Both carburizing and brazing can be done in one heating of the work. Carburizing can also be combined with martempering.

No "oxygenation" of the case —No pitting and spalling.

Selective Carburizing Simplified —Immerse only the portions of work to be treated, or copper plate the areas that do not require carburizing.

Eliminates Usual Reheating Operation—Work is quenched directly from carburizing bath.

COMBINATION CARBURIZING-MARTEMPERING Saves 35%!

One operator runs a mechanized Ajax line that carburizes and martempers 65 outboard motor crankshafts per hour. Case depth of 0.040" is quickly obtained in a 1760°F bath. Besides an over-all savings of 35%, a copper plating operation and a straightening operation were eliminated. Rejects averaging 4% previously were practically eliminated.

Selectively CARBURIZED AND MARTEMPERED!

Only the teeth and internal spline of this AMS6260 gear are carburized to a 0.035 inch case with a 4½-5 hour immersion. Copper plating of the balance of the piece inhibits carburization. After carburizing and air cooling, gear is reheated and martempered at 500°F for 3½ minutes. Final hardness is Rc 62/63.

Write for Catalog 116B and documented case histories of carburizing installations.

Send Your sample parts to the Ajax Metallurgical Service Laboratory for processing. No cost or obligation.

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electric SALT BATH furnaces

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Indexed in Engineering Index

METAL TREATING

EDITORIAL

FIRST ANNUAL MTI AWARD

At the 1953 Annual Meeting of the Metal Treating Institute the Board of Trustees established an Annual MTI Award to be presented to the author or authors of a paper presented before the group or an article published in METAL TREATING magazine which would be judged as the outstanding contribution to the literature of the heat treating industry. At the 1954 Annual Meeting the first award was presented to the members of the Cost Accounting Committee (see page 18) which had been established previously to develop the fundamentals of a basic cost accounting system for heat treating operations. The Committee prepared, presented, and published (July-August, September-October issues of METAL TREATING) a series of four papers which the Award Committee judged to be the outstanding contribution of the year. The papers, now available in reprint form, cover the following subjects: *"Determination of Expenses," "Allocation of Expenses," "Determination of Unit Costs,"* and *"Application of Unit Costs."*

It should be pointed out that the facts presented in these papers comprise a system of determining accurate heat treating costs and are adaptable to both commercial and industrial departmental operations.

It should also be emphasized that it is not the intent of the Award Committee to limit this award to MTI members and it is the hope of the Institute as an association that 1955 will develop an outstanding contribution from somewhere within the metalworking industry.

In conclusion, as our front cover says, "Seasons Greetings," to you all.

C. E. Herington

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THE SANFORD PROCESS

A method for developing a wear and corrosion resistant surface on aluminum alloys

By **JOHN B. FRANKLIN,** *General Manager, Sanford Process Co. Los Angeles 11, California*

A new process developed by Sanford Process Co., a subsidiary of Farbest Corp., Los Angeles, Calif., gives aluminum products enough surface hardness to serve the purpose of steel products where extreme wear resistance is required. In addition, it permits the use of aluminum alone in the manufacture of electrical and electronic components which require considerable dielectric strength.

In essence, it is an electrochemical process whereby aluminum surfaces are oxidized. It differs from conventional anodizing methods to the extent that it permits a buildup of oxide coatings with enough thickness to be of optimum practical value. It involves the following specific operations:

1.) Vapor degreasing or cleaning in an alkaline bath—much the same as in electroplating, although the parts do not have to be as clean as they would have to be if they were to be plated. Fig. 1 shows the method of stopping off areas to be left untreated.

2.) Immersion of parts in an electrolyte comprising mineral and organic acids, see Fig. 2. The electrolyte is chilled to temperatures of 0° to 15° F. to reduce the activity of its acid constituents to the point where they will not attack the aluminum.

Fig. 1—A portion of an aluminum cylinder is immersed in a hot plastic dip coating. Purpose of this is to mask off areas where surface hardness is not desired.

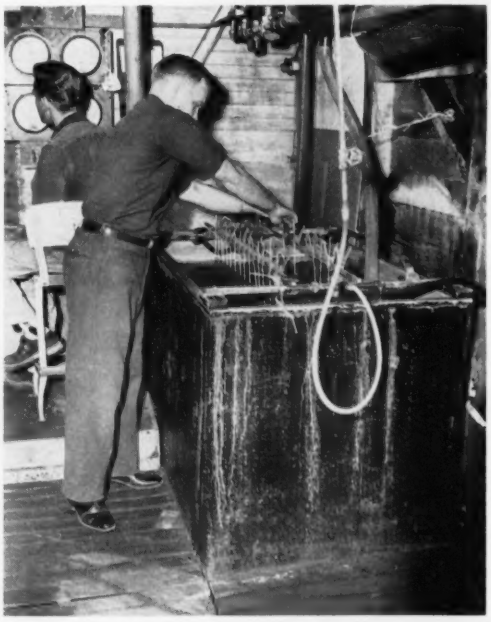


Fig. 2—Racked aluminum parts being immersed in the processing solution. The worker in the background watches instruments which permit him to maintain the correct flow of current through the tank.

3.) Use of 15 to 150 volt current at 12 to 15 amperes per square foot to produce a heat factor which will convert aluminum to aluminum oxide. The flow of current is between parts, which serve as anodes, and the sides of a stainless steel tank, which retains the electrolyte and serves as a cathode.

4.) Cold and hot water rinsing of parts. The latter are rinsed in cold water alone to remove acids; then, if no supplemental coatings are to be applied, their oxidized surfaces are sealed by soaking them in hot water for an hour. No sealing is desirable if the parts are to be finished with organic coatings or related materials, since the latter can be most satisfactorily bonded to unsealed surfaces.

Function of the organic acid in the electrolyte is to distribute current evenly and to sequester metallic ions taken into the solution by solubilizing aluminum. This makes it possible to obtain

aluminum oxide coatings of consistent hardness and uniform thicknesses.

Mineral acids serve the purpose of solubilizing aluminum so that oxygen will come in contact with the surfaces of the parts being processed.

Chilling of the electrolyte is accomplished by constantly circulating the fluid through a refrigeration coil, which is situated above as in Fig. 3, or alongside the processing tank. The coil is not located in the processing tank, because there it would take up valuable work space and be relatively susceptible to damage.

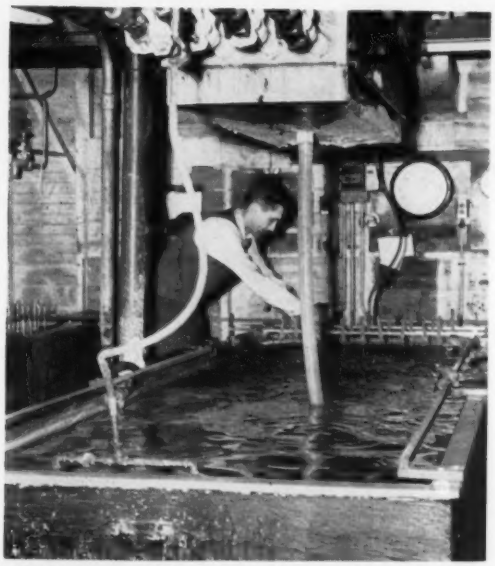


Fig. 3—This is one of the larger tanks now being used to process aluminum parts. The acid solution is constantly circulated through the refrigeration unit above the tank to maintain an operating temperature of 0-15°F.

Processing tanks in use at present are welded stainless steel structures with capacities ranging from one gallon to 8900 gallons. Substantially larger tanks could be satisfactorily utilized if parts dimensions or production requirements should make their construction desirable.

The power required to operate a given tank depends on the number of square feet of work being processed at any specified time. Each square foot of work necessitates the use of 15 amperes of current.

Oxide coatings being built up by means of the new process have such uniform and such easily-controlled thicknesses that they have been applied in a number of circumstances for the purpose of reclaiming overmachined parts. Their thicknesses are controlled simply by limiting the amount of time during which parts serve as anodes in the electrolyte. About 10 minutes of processing time will yield an 0.0005" coating, while 55 minutes of processing time will produce an 0.006" coating.

The colors of oxide coatings produced by means of the Sanford process depends on the compositions of aluminum alloys and the thicknesses of their oxide layers. For instance:

A thin coating on 75S stock has an amber hue; heavier coatings have brown, black, and gray-black colors.

A thin coating on 61S has an amber hue; heavier coatings have light and dark black colors.

A thin coating on 24S has an amber hue; heavier coatings have light and dark blue colors.

Costwise, the Sanford process is somewhat more expensive than conventional anodizing methods, for reasons that should now be obvious. However, coatings produced by means of the new technique cost about 40% less than hard chrome plating—one of the few finishes that will impart comparable wear resistance to aluminum surfaces.

In addition, the new coatings have much better bond strength than electroplated finishes because they are integral components of parent metals.

Tests recently conducted to determine the relative ability of Sanford coatings to prevent corrosion disclosed that the latter will withstand more than 13,000 hours of salt water spraying. Conventional anodic coatings, subjected to the same tests, prevented corrosion for no more than 250 hours.

Gale Electronics Company of Los Angeles currently specifies the use of Sanford coatings on items like forms for coils. Besides having enough dielectric strength to insulate the aluminum parts where 4000 volts of current are employed, the coatings substantially reduce cost and weight factors and are much less susceptible to damage than previously-used insulation materials.

In racing cars, aluminum pistons usually become so worn that they must be replaced after every third race. However, a recent test disclosed that such pistons are as good as new after 35 races if they are finished by means of the Sanford process. This explains why the new process is being used in the manufacture of valves, cams, cylinders, abrasion strips, brake discs, and other parts which must withstand considerable friction.

Despite their extreme hardness, "Sanfordized" parts are not excessively brittle. In fact, they usually have more mechanical strength than uncoated aluminum components. Moreover, they may be ground, lapped, or otherwise finished like hardened steel products.

A manufacturer of precision equipment has further reported that Sanfordized parts are capable of withstanding intermittent flame impingements. This is attributable to the fact that aluminum oxide, a ceramic, is a poor conductor of heat as well as electrical energy.

No difficulties have been experienced in Sanfordizing parts with holes and other recessed areas, which could not be electroplated. In point of fact, the internal surfaces of tubes that were ten feet long have been satisfactorily treated. ■ ■ ■

HEAT TREATING INCONELS

Interesting Results Obtained With Nickel Alloys

By **T. A. DICKINSON**
West Coast Reporter

Although standard Inconel, which has been extensively used for many years in various forms including sheets, is not classed as a heat-treatable material, some recent experience with two of the modifications of Inconel which may be heat treated are of interest. Inconel "W" and Inconel "X" in sheet form or in components made from sheets may be heat treated with very good results. Composition of these alloys is given in Table I.

An example of firms that are doing this work is Stainless Steel Products, Inc., of Burbank, Calif., whose general procedure will be discussed in this article. Products typical of this concern are shown in Figs. 1 and 2.

Both Inconel "X" (with an upper limit of 1500° F.) and Inconel "W" (with an upper limit of 1100° F.) are immaculately cleaned before they are heat treated. In addition to vapor degreasing, this normally involves immersion in an acid cleaning solution of the type used by electroplaters for 5 to 10 minutes at 180° to 212° F.

If soil on the parts to be treated is stubborn, a 5 to 8 volt potential may be applied at a maximum of 600 amperes (with the work positive and the tank negative) for 1 to 3 minutes. A series rheostat is used to reduce voltage to the required load.

Acid-cleaned parts are dipped successively in cold and hot rinse baths, then dried with air.

The Inconel materials may also be passivated by acid pickling if their surfaces have been exposed to sulfur, copper, or zinc bearing materials which might cause intergranular penetration.

Typical time and temperature conditions for the heat treatment of Inconel "X" and Inconel "W" are shown in Table II.

Although both Inconels are normally procured as solution annealed materials, the "X" alloy requires a re-solution anneal if any appreciable cold work or forming has been done; while Inconel

Fig. 1—Rubber stamp markings on parts processed indicate the condition of the material, as shown here, and thus minimize the possibility of heat treating material which is insufficiently clean.

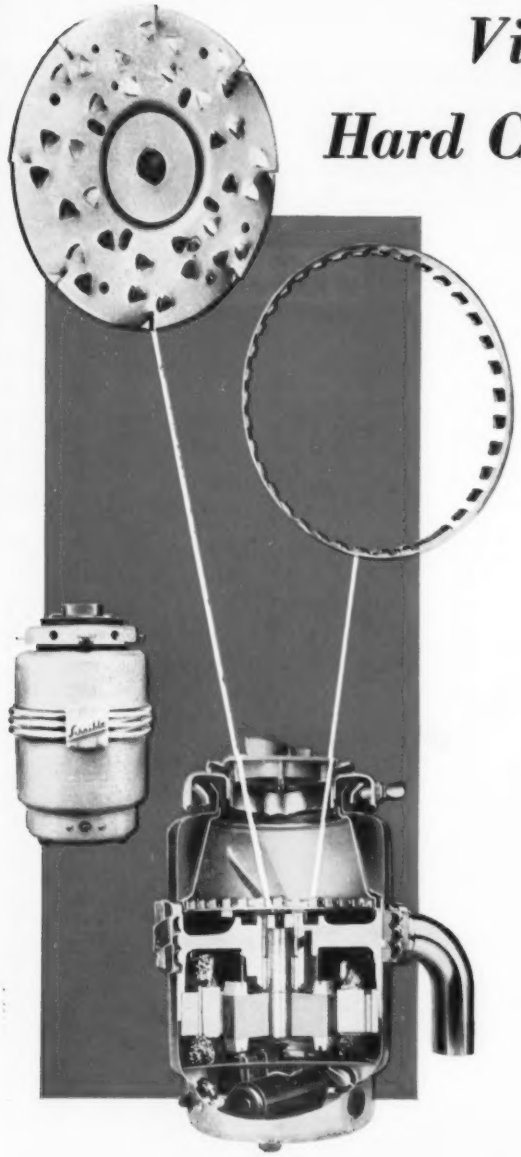
TABLE I
CHEMICAL COMPOSITIONS

Element	*Inconel "X"*	*Inconel "W"*
Carbon	0.08 max.	0.08 max.
Manganese	0.30- 1.00	1.00 max.
Silicon	0.50 max.	0.05 max.
Sulphur	0.01 max.	0.01 max.
Copper	0.20 max.	0.50 max.
Columbium	0.70- 1.20	—
Aluminum	0.40- 1.00	0.40- 1.00
Titanium	2.25- 2.75	2.00- 2.75
Iron	5.00- 9.00	5.00- 9.00
Chromium	14.00-16.00	14.00-17.00
Nickel & Cobalt	70.00 min.	70.00 min.

(Continued on page 6)

The Schaible Story:

Vital Grinder Parts Hard Cased in Park-Kase 5-C



The new grinding principle of the Schaible Food-Waste Disposer is shown here. Particle discharge size is positively controlled by reduction grating through horizontal milling action, impingement cutting and clipping. The snag-toothed cutter and the clip ring used in this process require hardness and toughness. Park-Kase 5-C gives these tools the necessary hard case for years of efficient, dependable service.

Fifth in a series of advertisements describing Park processes on the job

Maximum Hardness at LESS COST for Schaible Cutter Disc and Clip Ring!

At the Schaible Company the grinding elements used in the production of the Schaible Food-Waste Disposer are precision hard cased with water soluble Park-Kase 5-C. Result: a higher hardness which means longer life and greater efficiency for these fast-action grinding teeth . . . *in less time and at less cost.* Here's why:

The rapid and uniform case depth of Park-Kase 5-C liquid carburizer means fast, reproducible cases which can be held to close limits for accurate, dependable work at temperatures up to 1700°F. Park-Kase 5-C produces eutectoid carbon cases which contain enough nitrogen to be file hard after oil quenching. High penetration rates and ease of cleaning are combined for ideal carburizing conditions. Inexpensive, simple, and trouble-free . . . Park-Kase 5-C lowers production costs.

- Lightness of Original Charge and Reduction of Salt Drag-out Keeps Costs Down.
- Does Not Foam While Operating.
- Water Solubility Means Time Saved on Oil Quenched Work.
- Needs No Special Complicated Mixing Procedures.

Complete details of the Park-Kase 5-C Carburizing process covering all phases of its operations are described in a technical bulletin available by mailing the attached coupon.

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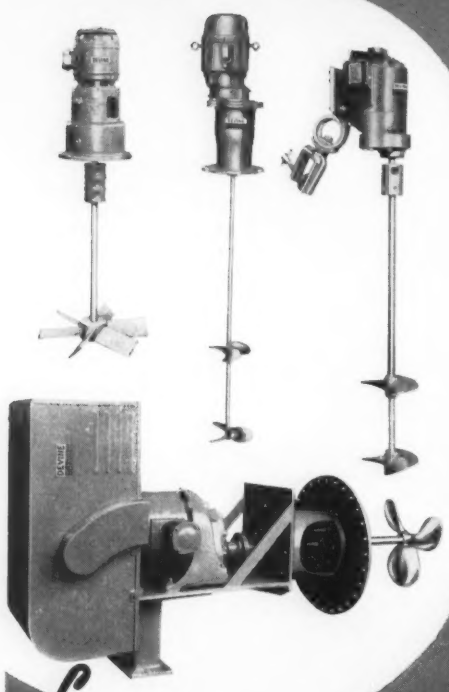

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- Compact. Self-contained. No piping required.
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J. P. DEVINE MFG. CO.
A. M. Cox, President
49th Street and A.V.R.R. Pittsburgh 1, Pa.

"W" may be used after nothing more than an aging treatment if the amount of cold work is small.

Atmospheres for all steps in either case are slightly oxidizing (0.1% to 0.5% O_2). No reducing atmospheres or gas curtains are required.

The materials are air cooled after the respective solution heat and aging treatments.

In order to make sure that the heat treated Inconels will have the mechanical properties shown in Table III, duplicate test coupons are run with each furnace load. These coupons are tested to destruction, and resultant data are used to determine whether the components of the load should be accepted or rejected.

TABLE 2
TIME AND TEMPERATURE

Operation	Inconel "X" Temperature	Inconel "X" Time	Inconel "W" Temperature	Inconel "W" Time
Rods & Forgings* Solution Anneal	2100±25° F.	4±¼ hrs.		
Aging	1550±25° F. (first stage)	20±24 hrs.	1300±25°F. (single stage aging)	16±¼ hrs.
	1300±25°F. (second stage)	20±24 hrs.		
Sheets Solution Anneal	1875±25°F.	30±10 min.		
Sing'e Stage Aging	1300±25°F.	20±¼ hrs.		

* *Solution heat treatment is applied to forgings that have been cooled to room temperature subsequent to forging.*

Fig. 2—Fabricated Inconel parts such as these are carefully inspected at Stainless Steel Products, Inc., Burbank, Calif.

TABLE 3
MECHANICAL PROPERTIES

Type	Material	Min. Yield Strength, psi, 0.2% Offset	Minimum Tensile Strength	Rockwell Values
Inconel "X"	Rods & Forgings	110,000	155,000	26-35C
	Sheet	100,000	155,000	30-37C
Inconel "W"	Rods & Forgings	75,000	140,000	22.5C Min.

■ ■ ■

Dimensional Control System

MINIMIZES FINISHING COSTS

Distortion And Size Changes Predicted Before Heat Treatment

By **L. L. McARTHUR,** *Chief Metallurgist*
E. H. KINNE, *Assistant Supervisor*
Rollway Bearing Company
Syracuse, N. Y.

Accurate heat treatment of diversified production lots of roller bearing parts depends upon correct and effective control. This control takes several forms: metallurgical structure of raw material; systematic furnace atmosphere and temperature control; and specific quenching techniques.

Finishing costs on precision roller bearing parts are minimized at Rollway Bearing Company, Syracuse, New York, by means of a dimensional control system incorporating these factors which predicts the precise amount of stock necessary to allow for distortion and physical size changes occurring during heat treatment.

Accurate stock allowances are listed on master charts which apply to any possible combination of diameter, length or section measurements of any size bearing. These allowances are assigned to each part before rough machining. Averaged from hundreds of measurements repeatedly taken during standard heat treating cycles, they are used to calculate exact machining, heat treating, and grinding tolerances of parts.

Built for hundreds of applications, Rollway bearings necessarily differ in size, weight and design. Rigid specifications must be met for each type. Some are case hardened while others are through hardened. Some heat treated sections require finish grinding, but other areas, which will not be finished ground, must conform to specified dimensional tolerances after heating and quenching. Some of the heat treating equipment at Rollway is shown in Figs. 1 and 2.

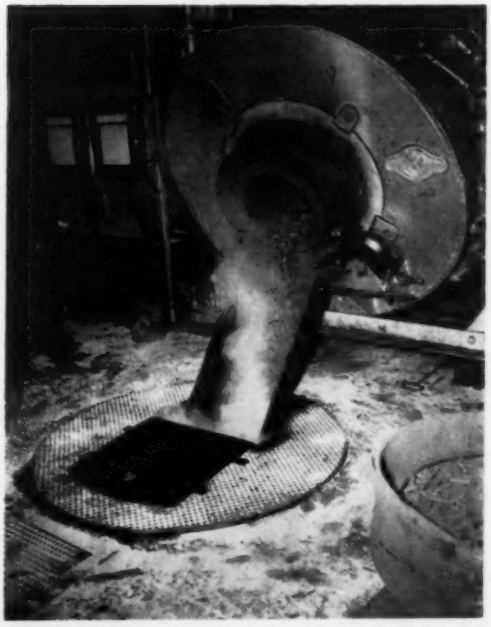


Fig. 1—Rollers to ½" diameter are carburized in a rotary retort carburizer then quenched in a floor tank.

Methods of Quenching

Quench oil is maintained at between 125-130° F. Stored in one central tank, which feeds the rest of the quench tank system, this warm oil has less

viscosity and better heat transfer properties. To augment processing controls, special handling precautions during quenching are necessary. The following procedures are typical:

Grate Quenching—a large grate is supported by a crane. Large parts are pulled onto the grate from the furnace. Then both grate and work are lowered horizontally into the quench. This method allows large parts to be handled safely and efficiently.

Crane Handling—when quenching extra large plates they are pulled to the furnace door where a cable, attached to a crane, is inserted and fastened. The crane hoists the plate out of the furnace, over and into the quench tank, quenching the part in a vertical position.

Special Fixtures Quenching—smaller plates are removed from the furnace by hooks, which support the parts vertically. Uniform hardness in this position results since gas pockets are not formed and distortion tendencies are minimized.

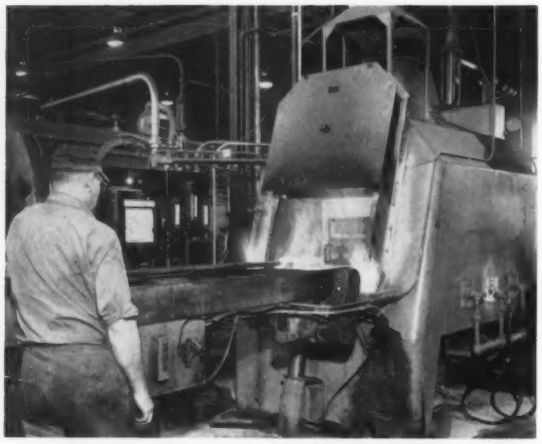


Fig. 2—This Ipsen furnace is used for hardening 52100 and carburized steels. A neutral atmosphere is fed into the furnace at 350 cfh for clean hardening.

Delayed Quenching—employed for thin-section parts that might tend to warp. For example, a part with a 30″ OD, 28″ ID (half-inch thickness) is quenched, held in oil until it reaches 500-600° F. Since the part is in a plastic state (above the Martinsitic range), it is fastened securely to a stationary quenching fixture and is quenched down to 125° F. Its hardness is thus developed during this second, less severe, quenching cycle.

Press Quenching—many dies are available for handling certain sizes of races and plates. This equipment is used whenever part size and distortion must be controlled to a very few thousandths of an inch.

Because distortion and growth factors are related to the amount and type of agitation taking place during the quench, all tanks have individual agitation systems. Agitation is created by a steady discharge from pipes located in each tank bottom.

All through hardened work is tempered at 385° F. which provides a sufficiently high operating temperature. The duration of this operation is dependent upon the mass involved, and consequently can extend up to 25 hours. Tempering is accomplished in special furnaces and baskets.

Size Control

To minimize subsequent finishing costs, the effect of each heat process upon the surface, physical size and distortion of a particular bearing part must be determined and controlled.

By establishing economical finishing allowances for any type or size part, Rollway achieves that control. These allowances were averaged from numerous heat treating tests.

A typical test used about 50 bearing races which were numbered, measured with micrometers, then heat treated. After quenching and tempering the parts were again measured. These measurements indicated the maximum, mean and minimum size and distortion changes that could be expected on production runs. Besides forecasting minimum stock allowances for grinding and surfacing operations, such measurements also indicated whether the heat treating process would maintain unground bearing parts to specifications.

Three different allowances are made for each bearing part in order to: (1) remedy surface coarseness resulting from preliminary rough machining; (2) compensate for growth or physical size change; (3) allow for distortion effects. The first allowance, to remedy the effects of preliminary facing, boring and turning operations on the part's surfaces, has become a rule of thumb and is dependent on part size only.

A second allowance, for growth or physical size change, varies with the three general steels used in Rollway Bearings: (1) SAE 8620 for carburizing; (2) SAE 52100 for through hardening; (3) modified alloys of SAE 52100 for other parts to be through hardened. Each group is sub-divided according to the OD measurement of the race. Within a group, OD and ID allowances are formulated, then charted as increments of OD size of one-inch progression. Then, using dimensional data, obtained from numerous test runs, the growth factor is listed as averages of maximum, mean and minimum change for each type of steel in terms of physical size change per inch of bearing race diameter. (See Chart I.)

In much the same manner as allowances for physical size change, distortion allowances are calculated by measurements and analysis of distortion effects upon three dimensional characteristics of a bearing component—OD and ID, length and section. To determine total stock allowance, these physical factors are charted according to the combined results of test runs through heat treating for

(Continued on page 10)

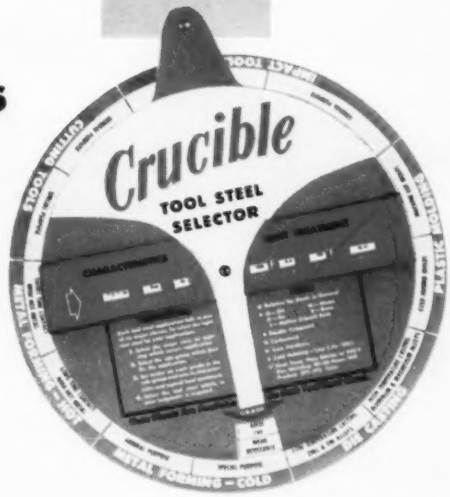
eliminate the guesswork in selecting tool steels

Thousands of metal working people are using the Crucible Tool Steel Selector to determine exactly which type of steel they need. This handy selector covers 22 tool steels which fit 98% of all tool steel applications.

The selector is unique because it starts with the ultimate use of the steel. It breaks down all tool steel applications into six major classifications, under which the different grades of steel available for certain specific requirements are indicated in legible cutouts. Heat treatment and machinability data are also included for each grade.

A flip of the dial will give you the answer, and almost just as quickly you can get the steel you select. For each type of steel shown on the selector is in stock in Crucible warehouses, conveniently located throughout the country.

To get your Selector merely fill in the coupon and mail. There is no obligation whatsoever.



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HERE'S AN EXAMPLE:

Application — Deep drawing die for steel

Major Class — Metal Forming — Cold

Sub-Group — Special Purpose

Tool Characteristics — Wear Resistance

Tool Steel — Airdi 150

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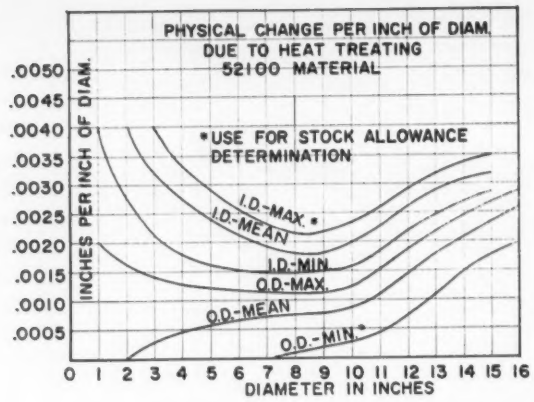
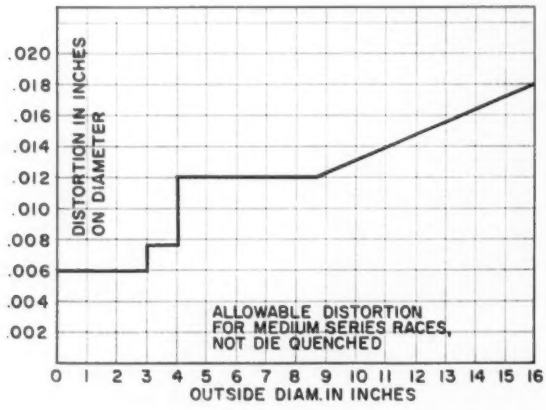
Chart I



surface condition, physical size change and distortion variables.

After this method of handling distortion allowance variables is arrived at, it is necessary to plot the average distortion occurring during the heat treat of various bearing races. To illustrate these variables, a graph, such as Chart II, is set up with the coordinate reference representing distortion in thousandths of an inch, and the ordinance reference, diameter in inches. By plotting points on the

Chart II



graph, the location of curves are determined, which represent distortion experienced after hardening and tempering but before straightening, and also resultant after straightening. These curves are plotted to consider the actual relationship of bearing race's diameters, length and section. They also are used to determine the degree of distortion acceptable without supplementary straightening as well as the amount of straightening required to pass intermediate inspections before the component is released from heat treating.

A Rollway-designed, hydraulically-operated device, see Fig. 3, straightens components that exceed production tolerances. First, a race is checked for size and degree of out-of-roundness. With this information applied to reference charts that indicate to what dimension the minor ID axis must be increased beyond mean diameter, the part is placed in a hydraulic straightener and is mechanically distorted in a reverse direction until this dimension is reached. During straightening, this reverse strain is tracked to the predetermined dimension by visual observation of a dial indicator. When this point is reached, screw jacks are inserted in line with the expanding members to hold a part in this shape for subsequent heating in a salt-tempering furnace. Upon removal from the furnace and after the jacks are released, the part once more is circular within prescribed limits.

Fig. 3—A Rollway-designed, hydraulically-operated device straightens bearing races that exceed production tolerances.

Charting Allowances

The value of distortion allowance used, for example, in determining the OD stock allowance for a 10" OD by 9" ID race with a 3½" section is .013". In addition, by using the previously outlined values for machining and physical size change the OD machining allowance would be +.006", the OD physical change size allowance, +.003". By combination, then, the stock allowance for the 10" OD race would be the total of the three allowance factors minus the gain due to physical size change for the race's OD, or .006"+.003"+.013"—.003"=.019"*. This figure represents a nominal stock allowance to which, in effect, is added a positive machining tolerance.

These total stock allowance values are placed in a master chart under the OD heading (10" OD by 3½" length by ½" section) and under the ID section (9" ID by 3½" length by ½" section).

It can be seen, then, that with the aid of a master chart for all race sizes, necessary stock allowances can be immediately determined for any combination of diameter, length and section of any bearing race to be heat treated at Rollway. ■ ■ ■

* This actually eliminates the physical size allowance since it is added and then subtracted in computations, thus resulting in an additional positive allowance.

Aluminum Coating Increases Oxidation and Corrosion Resistance of Steel

"Alumicoat" process reported to permit use of mild and low alloy steel above 1800°F.

The Arthur Tickle Engineering Works, Inc., Brooklyn, N.Y. has released information that the high temperature oxidation of mild and low alloy steels can be stopped or materially reduced with its "Alumicoat" process instituted under license from the General Motors Corporation, patent #2569097. The company is the first to be licensed for the commercial use of the GM process although other manufacturers have been granted permission to use it for their own products.

Aluminum coating has been common for some time and although half a dozen steps are used in the new process the key to its success lies in the patented flux bath used before dipping. The bath consists of Sodium and Potassium Chloride with additions of Kryolite and Aluminum Chloride.

The operations involved in obtaining the coating and penetration of aluminum into the part consist of: (1) clean in hot caustic bath (2) rinse in cold water, (3) flux in patented salt bath, (4) dip in molten aluminum bath and (5) remove and drain. Variations in this procedure are at times made for a number of reasons. If, for example, parts are heavily rusted and do not clean up in the caustic bath, they are dipped in a solution of 25% muriatic acid (cold) and then rinsed in steam or boiling water.

At the present time much of the work processed at the plant is dipped in an aluminum-silicon alloy rather than pure aluminum. The Al-Si alloy has greater ductility, particularly above 1400°F., although it offers less corrosion resistance than pure aluminum. When finished or semi-finished assemblies are dipped, selected areas can be "stopped-off" using a wash containing titanium oxide, sodium silicate and water.

For processing, the flux is held at a temperature of approximately 1200°F. in an Ajax salt bath while the Al-Si alloy is maintained at 1240 to 1250°F. Parts are held in the salt bath until soaked through but the time in the alloy (or pure aluminum) varies from only 30 to 60 seconds. This results in .0015" to .002" penetration into the part, with approximately .001" of alloy on the surface. Deeper penetration can be obtained by building up the surface layer and diffusing this into the part at 1800°F.

Parts have been in service for two years and have surpassed high alloys in performance in some cases. Test data has been collected and the following figures show comparative test performance for pure aluminum coatings:

Material	*Temperature*	*Hours*	*Change in Weight**
Untreated 18-8 Chrome-Nickel	1350°F.	24	−17.0%
Untreated 25-20 Chrome-Nickel	"	4	− 8.3
Untreated 27% Chrome Steel	"	24	− 8.4
Al-coated Plain Steel	"	192	+ 0.1
Al-coated 18-8 Chrome-Nickel	"	192	+ 0.1
Al-coated Plain Steel	1700	48	+ 0.3
Al-coated 18-8 Chrome-Nickel	"	48	0.0

* *After removing scale.*

Removing a part from the aluminum bath after 30 to 60 seconds. Some flux adheres to the surface but can be easily removed after cooling to leave a clean surface.

AUTOMATION And The Gas Industry

Excerpts from an address by

FREDERIC O. HESS, *President*
Selas Corporation of America
Philadelphia 34, Pa.

Delivered at the Industrial Gas Breakfast of the American Gas Association, Palmer House, Chicago November 3, 1954

Automation is a new word, but it has already assumed many meanings and interpretations with the help of our literary artists and our own imagination and position. Therefore, let us first analyze and stipulate what we might understand or mean before we try to establish any relationship and effect upon the gas industry.

Automation is a contraction from automatization and is credited to the auto industry or, specifically, the Ford organization. First, it appeared to mean the fitting together and controlling by instruments several mechanical operations and movements for the purpose of producing completely machined and dimensionally checked cylinder blocks.

As for the automatic factory, we must realize and appreciate that we had automatic factories as early as 1784. At that time there existed, outside of Philadelphia, an automatic continuous-process flour mill which employed no labor from the grain to the finished flour. Not quite as early, but many years ago, A. O. Smith created his automatic factory for making automotive frames and laid the foundation for the present A. O. Smith organization. Again, supervisors operated the plant with practically no labor. One might conclude Automation is just a matter of labor replacement with automatic controls, and because we have controls today the automatic factory is just around the corner or here on a broad scope. I believe that interpretation of automation cannot be right because labor saving has long been a factor and is nothing new in our production concept.

By now you should be thoroughly confused about the meaning of automation. Actually, I have described a number of automatic mechanisms performing a number of limited tasks or operations. Missing is the deliberate process of product design or re-design and production setup. Automation in its proper sense and interpretation includes, or starts with, the full economic considerations of our advanced technology; our local requirements and the resulting appropriate re-evaluation or re-thinking of our entire production operations, the product, its purpose, its design, the process of production in terms of functions rather than operational steps now performed. Permit me to give you a few of my beliefs . . .

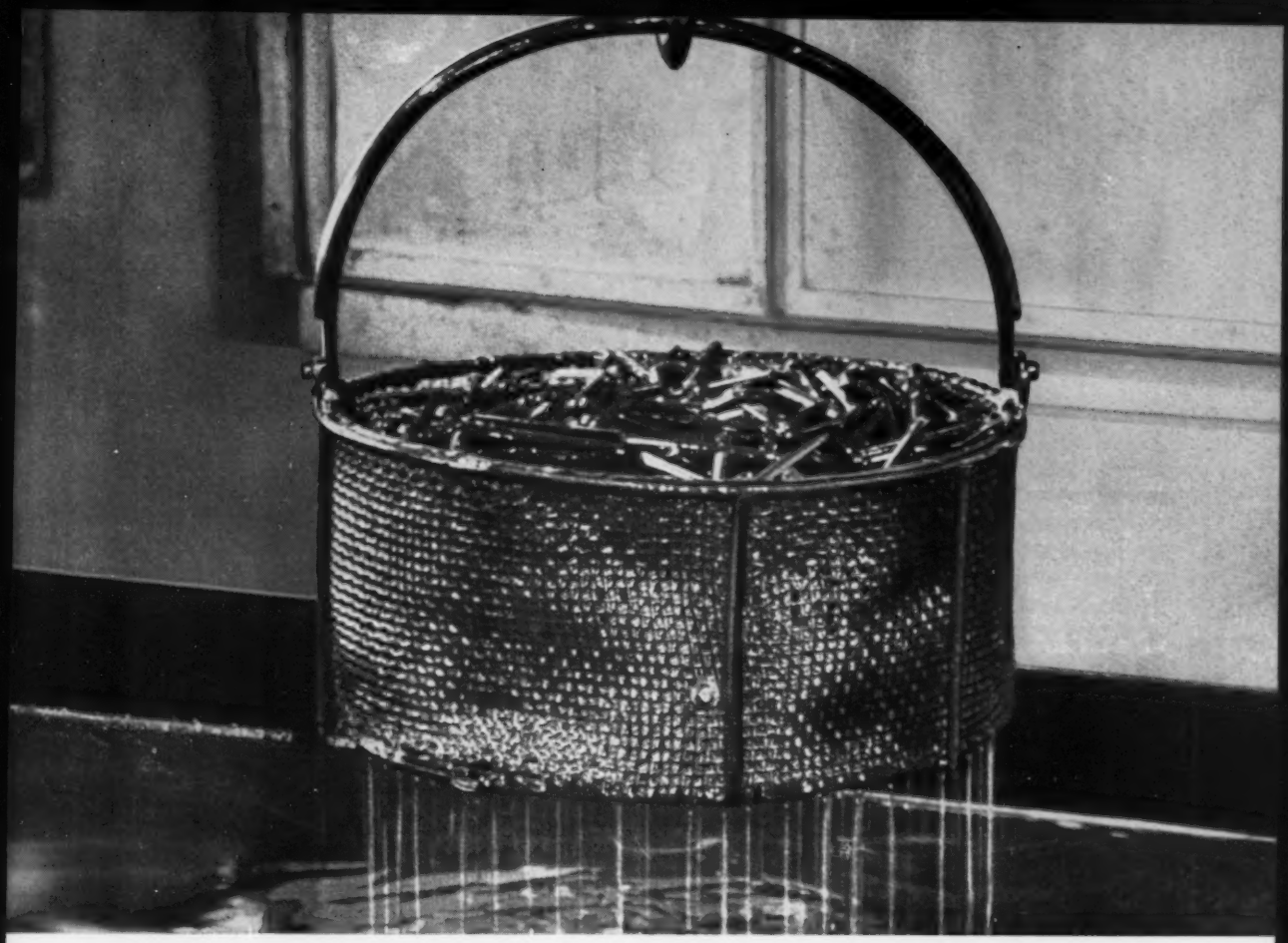
1.—I believe automation is not just a newly invented word, but that it calls attention to a national necessity; an economic must; a deliberate requirement of our progress. Technologically and economically automation draws the conclusion that we, our entire population, like more and more of the products, conveniences and luxuries of today. We want these things because of higher incomes and wages, and in spite of higher cost of production resulting therefrom, and we expect our enterprise system to find an answer to these contradictions. Automation implies such an answer.

2.—Beyond that higher production rates demand better methods of production as well as automatic inspection, control and operation. Electronic developments have made such control and even corrective functions possible. Therefore, various processing stages, so far by necessity, performed separately, can now be truly coordinated and synchronized through automation.

3.—Since, in a large measure, the success of automation depends on controls, a good deal of planning and thinking involves control technicians and engineers, and they are basically electrically minded and educated. The gas industry might well appreciate this fact, which constitutes a basic handicap so far as acceptance of heat generation, utilization and control of gas combustion for industry and new production processes is concerned. Who teaches the subject of combustion control and of control of gas, heat generation and application, and where is it being taught, and to how many? I challenge you to answer this simple question and compare it with your knowledge of electrical and instrument institutions and courses, and when doing so please bear in mind that you are searching for the teachings about the foremost industrial processing fuel of today—prior to automation.

4.—Cost of fuel has all too often been the deciding factor for the selection of gas, and in spite of its inherent qualities and capabilities accounts, in some measure, for the wide-spread use. In the future cost will play a less important part. Other factors will be dominant.

Summarizing, automation has much in common with research—it too is like a state of mind. Therefore, we can say, automation demands from the gas industry the most advanced, progressive engineering, fuel engineering, process engineering—and human engineering, inside and outside of our gas industry. ■ ■ ■



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Recommended Minimum Standard For Commercial Carbon Steel Castings

Includes recommended procedures for full annealing, single normalizing and stress relieving.

By GEORGE K. DREHER, Secretary
Steel Founders' Society of America
Cleveland, 15, Ohio

A *"Recommended Minimum Standard"* for commercial carbon steel castings, developed by the Steel Founders' Society of America, is ready for distribution to users and producers of steel castings. This is the first "Minimum Standard" in the century long history of the Steel Casting Industry.

This standard is the outgrowth of studies made by the S.F.S.A. Product Development Committee and subsequent recommendations calling for its preparation. Succeeding work and its ultimate drafting became the task and the accomplishment of the Specifications Committee. Thorough discussion in each of the eight Society divisions throughout the country focused the practical technology of the entire Society's membership into its final com-

This continuous heat treating furnace is typical of the type of mass production equipment used in many steel casting foundries for normalizing and stress relieving commercial carbon steel castings.

position.

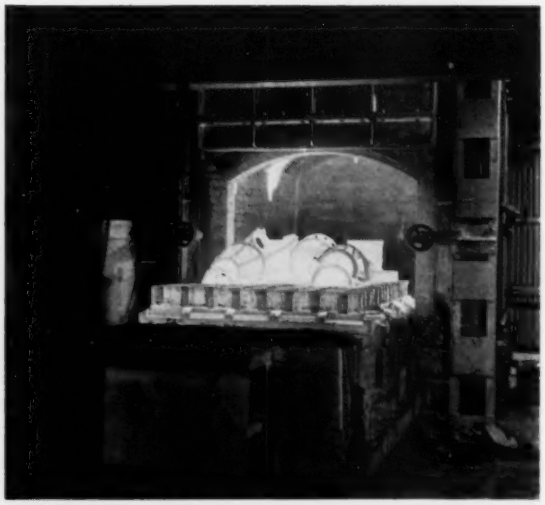
Acceptance of the standard will be voluntary on the part of both the customer and the steel foundry source of castings. It is not expected, nor is it intended that it displace other specifications now in use. It does, however, establish a firm basis by means of which the purchaser and the supplier of general commercial cast steel components can arrive at a common understanding. It represents a common sense approach to a fuller use of the properties inherent to cast carbon steel. With this standard the Steel Founders' Society of America goes on record as advocating the purchase and sale of carbon steel castings in a preferable physical and mettallurgical condition.

The standard emphasizes that its requirements are minimums and that they are not designed to influence in any way the production of castings which are practical improvements on such minimums. It is intended that all clauses apply unless otherwise agreed upon by producer and customer.

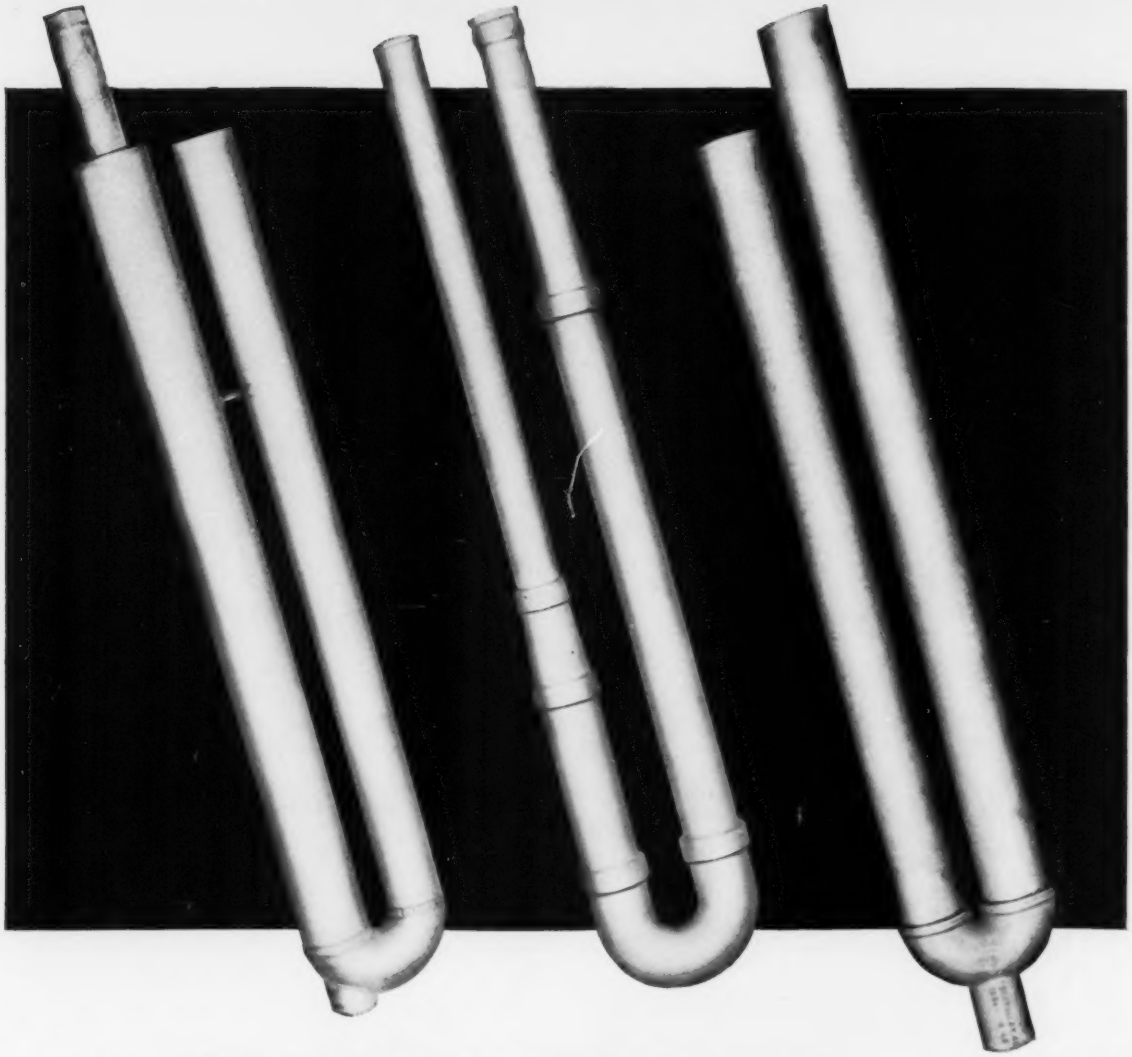
Heat treatment of steel castings is emphasized. The minimum standard recommends either full annealing, single normalizing or tempering (stress relieving) as desirable treatments. Research reports and literature issued by the Steel Founders' Society have identified the improved design properties achieved by heat treatment. A machinability research shows that heat treatment improves the machining characteristics of cast steel, an important factor in the cost of metal components. An extract of the paragraph pertaining to heat treatment is given here.

During the development of the "Recommended Minimum Standard" several foundries adopted the

(Continued on page 16)



Car-type heat treating furnaces are widely used for annealing or normalizing large castings. The castings above are being allowed to air cool after heating above the transformation temperature.



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Whatever your needs in radiant tube assemblies or other heat-treating equipment—you'll get more operating economy from high heat-resistant Thermalloy castings. Let us know your requirements. Call your nearest Electro-Alloys engineer or write Electro-Alloys Division, 5003 Taylor Street, Elyria, Ohio.

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practices advocated as a basis for their own operation. There will be applications and production, however, where the quality level set forth in this standard is not required. It must be emphasized that the use of this standard is a matter of voluntary agreement between the foundry supplying the steel casting and the buyer.

HEAT TREATMENT CLAUSE

C—Heat Treatment

C-1. Pyrometric equipment shall be used to enable the heat-treating procedures given in C2 to C4 to be satisfactorily carried out. Pyrometric equipment shall be maintained in accurate condition at all times. Checks for accuracy shall be made at least once each 30 days.

C-2. Castings shall be heat-treated by one of the following three methods at the option of the manufacturer:

(a) Full Annealing

(b) Normalizing

(c) Normalizing and tempering (stress relieving)

C-3. *Heating.* Regardless of the heat treatment employed, the castings shall be uniformly heated to a temperature above the transformation temperature and shall be held at this temperature for a sufficient length of time to refine the grain. The temperature difference between the hottest and coolest part of the charge during the holding period shall not be greater than 75°F. (See Note A)

C-4. *Cooling.* The castings shall be cooled as follows:

(a) Full Annealing. Castings shall be cooled slowly in a closed furnace from the annealing temperature. When the temperature of the furnace has fallen to 1000 degrees the castings may be removed and cooled in air.

(b) Normalizing. The castings shall be removed from the furnace and cooled in air.

(c) Tempering (stress relieving). Castings shall be heated to a temperature below the lower critical and held at this temperature for not less than one hour. After the heating period the castings may be furnace cooled or removed from the furnace and cooled in air.

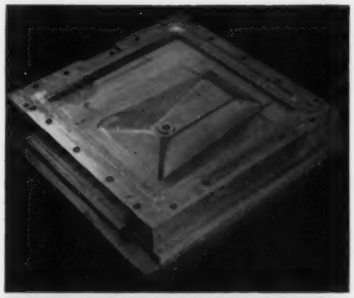
NOTE A: For information on the transformation temperature for commercial carbon steel castings see Fig. 283, page 209 in the Steel Castings Handbook, 1950 Edition.

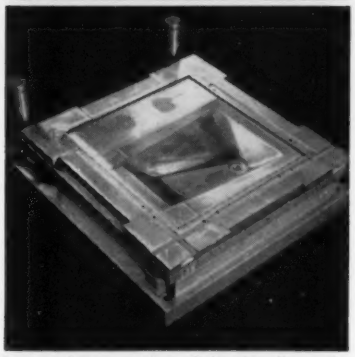
Copies of the "Recommended Minimum Standard," as well as a booklet entitled "The Machinability of Cast Steels" are available free upon request to the Steel Founders' Society of America, 920 Midland Building, Cleveland 15, Ohio. ■ ■ ■

Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation





Top and bottom sections of drawing die, made of BTR, which was used in manufacture of the water-fountain top illustrated at right.

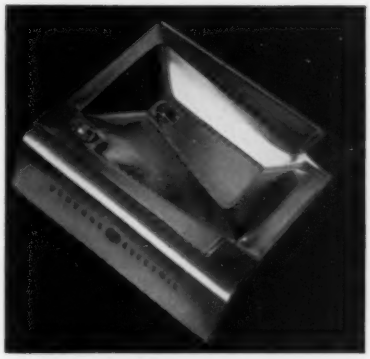
Die Draws 25,000 Stainless Pieces Without Showing Any Wear

The oblong section shown at right, a stainless-steel top for an electric water fountain, is one of a vast array of interesting specialty products being turned out by L. F. Grammes & Sons, Inc., Allentown, Pa.

To manufacture this part economically, engineers at the Grammes plant required a die having good wear-resistance, low distortion and good resistance to shock. What's more, they also wanted a tool steel that was both easy to machine and heat-treat.

BTR (Bethlehem Tool Room) was selected for the drawing die, which was hardened to Rockwell C-60 before being put to work in a 200-ton press. It's been giving a good account of itself, too. At last report, some 25,000 water-fountain tops had been produced, without any sign of die-wear.

BTR is a tough steel, with outstanding resistance to abrasion. You'll find it ideal in every way for many intricate tool-and-die applications.



BTR is our general-purpose type of oil-hardening tool steel, and has this typical analysis:

Carbon	0.90	Chromium	0.50
Manganese	1.20	Vanadium	0.20
		Tungsten	0.50

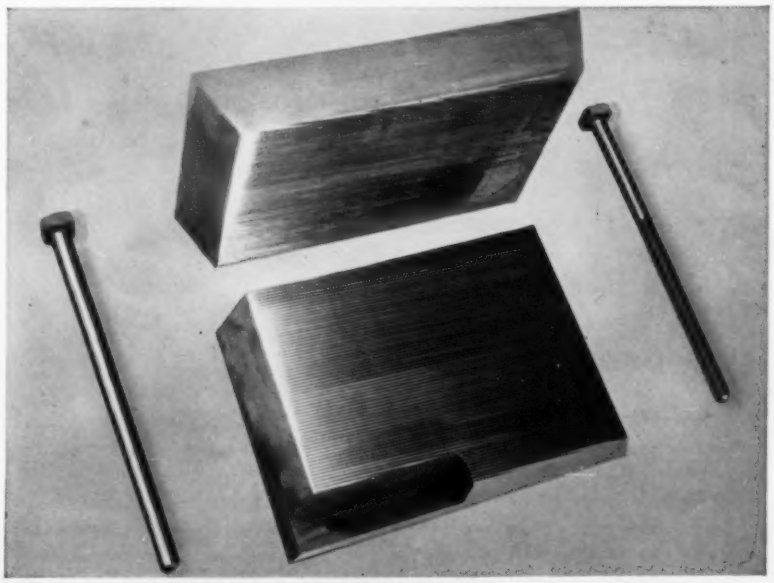
BETHLEHEM TOOL STEEL ENGINEER SAYS:

Don't Overlook the Interrupted Quench

One hears such a lot these days about isothermal annealing, martempering, automatic heat-treatment furnaces and a host of other modern processes that it is easy to overlook some of the old-time procedures which are still useful. For example, the interrupted quench.

An interrupted quench involves quenching a tool in water, then removing it from the water before the hardening transformation has started, and finishing the quench in oil. The tools should be removed from the oil while still warm, and should be tempered immediately. On water-hardening steels, an interrupted quench permits hardening of intricate sections which might crack if water-quenched all the way.

With oil-hardening steels, the interrupted quench permits hardening of sections which are too large to harden properly if oil-quenched all the way. At the same time this practice avoids the cracking which might possibly occur if a straight water quench were used.



THREAD-ROLLER DIES MADE OF LEHIGH H. These thread-roller dies, used in the manufacture of machine bolts, are made of Lehigh H, our air-hardening type of high-carbon, high-chromium tool steel. They have a Rockwell C hardness of 58-60. Lehigh H is resistant to wear, and has exceptionally high compressive strength, enabling threads to be cold-rolled on thousands of pieces before redressing is required.

MTI NEWS TO HEAT TREATERS...

MTI Achievement Award

The first annual Achievement Award of the Metal Treating Institute was presented to the members of the groups' Cost Accounting Committee at the Annual Meeting of the Institute held in Chicago, October 29-31st.

The committee established in 1953 had made an intense study of heat treating costing methods and had established a system of basic method of determining accurate costs in heat treating and can be adapted to most types of operations. Significantly, the method serves both commercial and departmental operations.

A number of commercial plants and industrial departments are currently giving the method serious consideration for adaptation to their individual needs and circumstances.

Shown with President C. M. Cook, left, are the winners of this year's Metal Treating Institute Achievement Award. At center is K. U. Jenks, Chairman of the MTI Cost Accounting Committee. Left to right are John Paterson, John P. Benedict (receiving award for F. C. Rimmele), Conrad H. Knerr and C. H. Muehlemeyer.

such value that the entire committee was awarded recognition plaques.

The committee was composed of: **K. U. Jenks, Chairman,** Lindberg Steel Treating Company, Chicago, Illinois; **F. C. Rimmele,** Benedict-Miller, Inc., Lyndhurst, N. J.; **Conrad Knerr,** Metlab Company, Phila., Pa.; **John Paterson,** Commercial Steel Treating Company, Detroit, Mich.; **C. H. Muehlemeyer,** O. T. Muehlemeyer Heat Treating Co., Rockford, Ill.

The result of the committee's work, the development of a basic cost accounting system for heat treating operations, was presented to the Institute during its 1954 Spring Meeting. The work was later published in METAL TREATING magazine as a series of four papers. These were: *"Determination of Expenses," "Allocation of Expenses," "Determination of Unit Costs," "Application of Unit Costs."*

The system developed is a

25-KW Induction Heater

A new 25-kw high frequency vacuum tube induction heater (Type EI-25C), reportedly for heavy duty industrial use, has

been announced by Allis-Chalmers Manufacturing Company, 1270 S. 70th St., Milwaukee 1, Wis.

The entire cubicle of the new unit is pressurized. Ambient air is drawn into the heater near the top, filtered, blown downward through the oscillator, through a baffle, into the rectifier section, and then exhausted through a grille on the rear panel of the cubicle. Ceramic coils are used to carry cooling water to high potential parts.

The heater's newly designed cabinet is formed from heavy gauge steel, rigidly constructed, and fitted with full-length doors for "walk-in" accessibility to the rectifier and oscillator sections.

It is reported that performance of the new heater has been improved, tube life lengthened, and maintenance further reduced by the use of regulated voltage on the filaments of all tubes and the application of a single oscillator tube of latest design.

Safety features incorporated in the heater include heavy duty industrial control, highwater temperature switch, low water flow switch, fuses, and interlocking doors which automatically shut off the power when opened.

The completely self-contained electronic heater features automatic timing for each unit operation. The operator merely pushes the start button which closes the circuit for the predetermined time for the operation as established by proper setting of the timer. Operations can be either manual or automatic depending upon the production setup for the job.

Automatic Hardness Tester

Three colored lights which signal the relative Brinell hardness of the test piece, make all the decisions of acceptability or rejection on Steel City Testing Machines' new "color glance" Brinell hardness testing machine. When tied in with some automatic means of handling the

parts on a production line basis, the new unit can be made to physically sort the work after testing, thereby making possible automatic Brinell hardness testing.

The three signal lights are set up so that yellow indicates "too hard," green designates "within range" and red shows "too soft." Limits are adjustable to suit the requirements of each job. During the test cycle, one of these lights flashes on, indicating the hardness category of the part under test.

Basically, the new machine is the same as direct reading type Brinell hardness testers except that a dial indicator with adjustable electric contacts has been substituted for the standard indicator previously used, and this is connected to a specially-designed control panel. No electronics are employed, thereby reducing the expense of maintenance. The machine itself is hydraulically operated.

Two-Wire Thermocouple

A new two-wire thermocouple, encased in stainless steel tubing, has been introduced by the Industrial Division of Minneapolis-Honeywell Regulator Company. The new device is available with either of two types of terminal heads: an open head assembly or a screw-cover head. The latter comes in two sizes. The stainless steel protecting tube is expected

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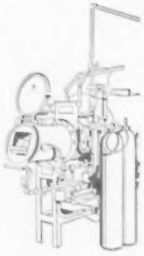

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- Sintering of metal powder compacts.
- Augmenting corrosion—resistance treating for aluminum, magnesium, other light metals.
- As a solvent in making electrolytes for electrolytic recovery of salts.

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to double the life of the new thermocouples. Accuracy of the new device is rated at plus or minus 5°F over a range from 0° to 1000°F. Fiberglass insulation in the new model thermocouples permits greater application flexibility than is possible with the ceramic-insulated pencil-type models. Lengths of the thermocouples range from 6 inches to 60 inches. Lengths of 35 feet are available on a special basis.

Die Life Improved With Change In Design And Heat Treatment

The Railway Accessory Department of Inland Steel Company was experiencing extremely short life with the dies used in the production of railway spikes. The dies, which received heat treatment in the conventional manner (hardened and tempered) were made of low carbon, molybdenum high speed steel. Life of the dies was inconsistent. Complete failure (breakage) often occurred after producing as few as 50 to 75 kegs of spikes, while other dies lasted for hundreds of kegs.

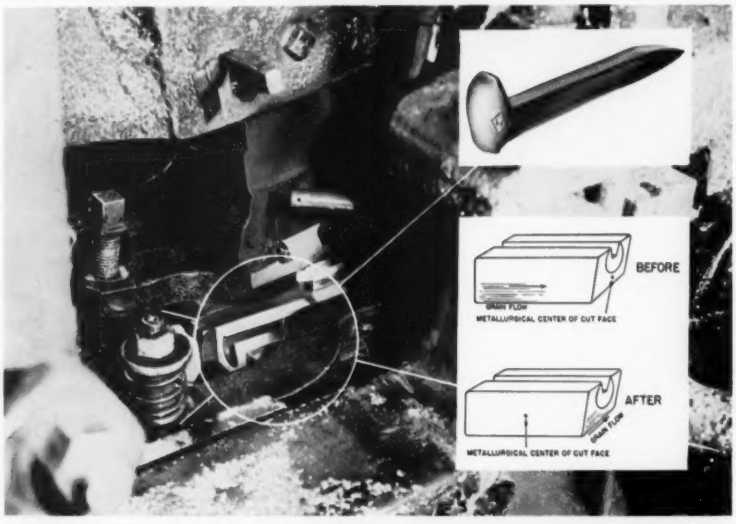
Engineers of Inland Steel Company, tool steel suppliers and Lindberg Steel Treating Company cooperated in attempting to solve the problem.

Investigation revealed the dies were made from bar steel in such a manner that the grain flow was parallel to the direction of the principal applied stress.

It was also established that the principal stress was directed against the metallurgical center of the bar. Both of these conditions, it was felt, contributed to poor die life. Therefore both were corrected by using a wider bar and machining the dies transversely therefrom.

This change in the method of machining the dies resulted in improved life. However, the improvement was not sufficient and further investigation concerning the failures was necessary.

The principal cause of failure was heat checking which eventually lead to complete breakage of the dies. Once heat checking started, the net work of cracks acted as notches promoting rapid fatigue type failures.



On the basis of the prevailing experience, it was decided to try carburizing the dies in order to produce a tough core and a hard case, the latter providing compressive stresses on the surface which would tend to minimize the propagation of the heat checks after they formed.

The following treatment was developed and applied to a substantial quantity of dies:

Pack carburize in charcoal at a temperature of 1850°F. to produce a case depth of 0.032-0.045". Quench in oil and triple temper to produce a hardness of 58-60 Rockwell "C" on the case. Blast with sand or steel grit after heat treatment.

The redesign of the die plus the change in heat treatment was definitely successful according to C. E. Chapman, superintendent of Inland Steel's Railway Accessory Department

Bearing Seizure

A new product, GLO 6-1, manufactured by the GLO Corporation 21949 E. Telegraph Rd., Trenton, Michigan, has been used to greatly reduce bearing seizure due to high temperatures on a roller type conveyor operating through a large, continuous, atmospheric heat treating furnace at the Steel Treat, Inc. plant in Detroit, Michigan.

GLO 6-1 contains synthetic, Colloidal, negatively-charged graphite, homogenized and partially suspended in a synthetic petroleum product that remains moist to 600° F. The Graphite is in particle size closely approaching solution and remains in suspension indefinitely. Because the critical temperature of the graphite is 6600° F., GLO Corporation engineers claim effective lubrication of any type or kind of bearings in mechanical or electrical equipment regardless of heat, speed, load, impact or shock. The graphite is both inert and non-abrasive.

D. E. Williams, vice-president and general manager of Steel Treat, Inc. reported that until he blended 10 percent of GLO 6-1 with his ordinary high temperature grease, he had not been able to lubricate properly, due to the temperature and the reaction of the gases from within the furnace causing greases or other lubricants to carbonize and gum up. This reaction seized the roll shaft and eventually forced shut down of the conveyor to disassemble the rolls and remove the carbonaceous material formed.

(Continued on page 31)

FOR Top Performance

DREVER CONTINUOUS STAINLESS STRIP ANNEALING AND DESCALING LINE

DESCALE THE DREVER WAY

Drever descaling units provide top performance wherever they are in service. Applicable to both batch and continuous operation, they include, where desired—preheat furnaces, descaling, water quench, acid dip, and high pressure water rinse tanks, as well as complete instrumentation. Years of diligent research and development in descaling practice qualify Drever to meet your proposed operations.

Shown above is an annealing-descaling line for stainless steel strip. This unit has a capacity of 2000 lbs./hr. Maximum strip width 24 inches. Single strip, or multiple strips can be processed. These units can be built for any capacity and any width of strip.

DREVER IMMERSION TYPE DESCALING BATH

8 tons of steel per hour is descaled in this 18 ft. caustic bath descaling unit. Operating with automatic temperature control at 930° F, this bath shows no appreciable drop in temperature after the load is charged.

DREVER CO.

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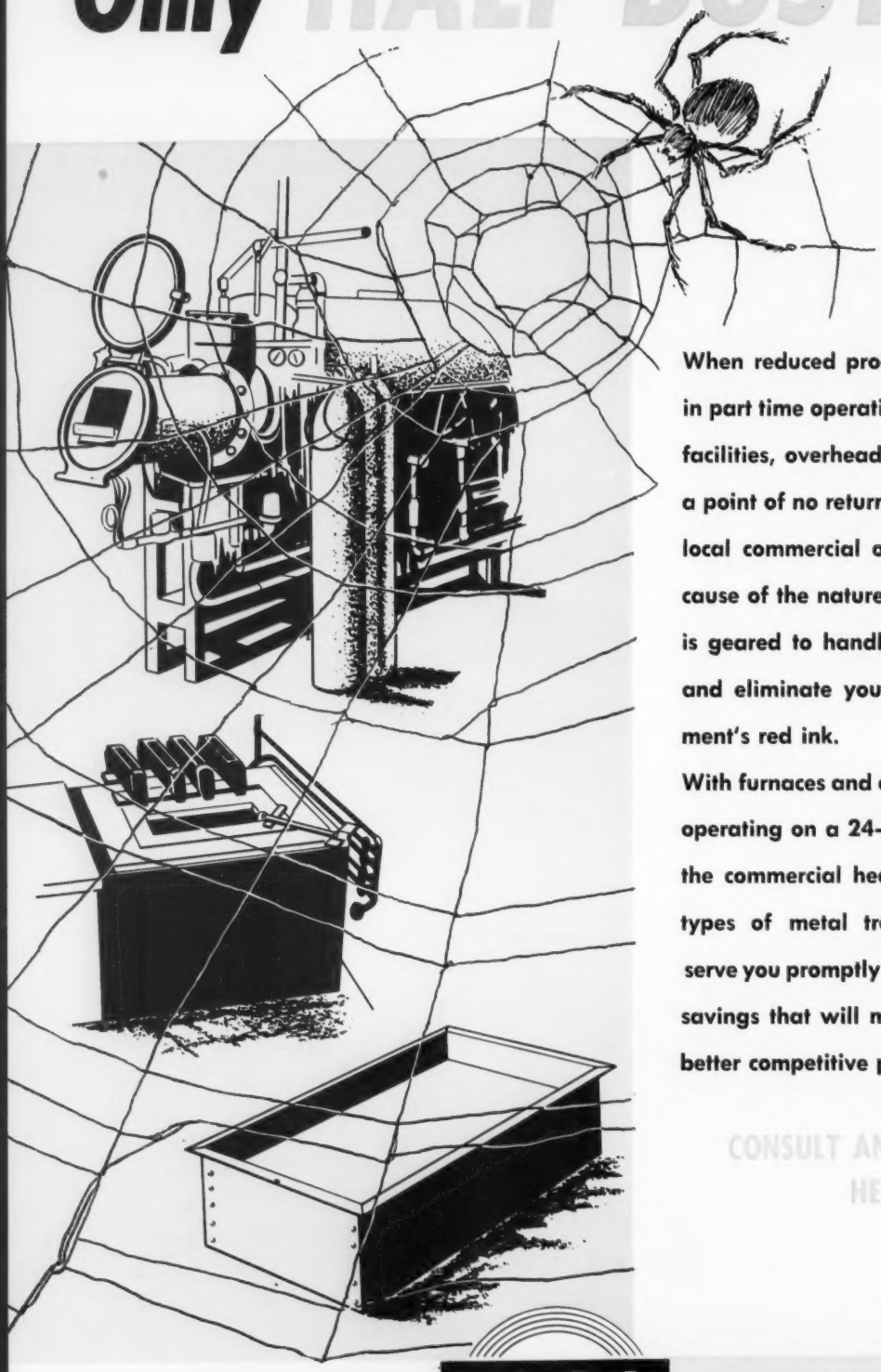

When reduced production schedules result in part time operation of your heat treating facilities, overhead burden rapidly rises to a point of no return. Chances are there is a local commercial organization which, because of the nature of his service business, is geared to handle your reduced volume and eliminate your heat treating department's red ink.

With furnaces and other equipment usually operating on a 24-hour day-by-day basis, the commercial heat treater, skilled in all types of metal treating operations, can serve you promptly and efficiently, with cost savings that will mean more profit and a better competitive position in your market.

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HEAT TREATING SPECIALIST

MTI MASTER CRAFTSMEN
METAL TREATING INSTITUTE

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Lindberg Steel Treating Co.
2910 S. Sunol Drive, Los Angeles 23
Malloy Heat Treating Co.
11648 So. Atlantic, Lynwood
Cook Induction Heating Co.
4925 East Slauson Ave., Maywood
Dexter Metal Treating Co.
1026—77th Ave., Oakland 21
Industrial Steel Treating Co.
1549—32nd St., Oakland 8
Valley Metal Treating Co.
355 So. East End Ave., Pomona

Metal Treating & Research Co.
4110 Fox St., Denver 16

Commercial Metal Treating, Inc.
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Stanley P. Rockwell Co.
296 Homestead Ave., Hartford 5

Seneeca Heat Treating Co.
70 S. Batavia Ave., Batavia
Accurate Steel Treating Co.
2226 W. Hubbard St., Chicago 12
Chicago Steel Treating Co.
333 North California, Chicago
Dura-Hard Steel Treating Co.
2333 West Deming Place, Chicago 47
Pearson Industrial Steel Treating
5757 Ogden Ave., Chicago 50
Perfection Tool & Metal Heat Treating Co.
1740 West Hubbard St., Chicago 22
Fred A. Snow Co.
1942 West Kenzie St., Chicago 22
American Steel Treating Co.
P. O. Box A, Crystal Lake
Eklund Metal Treating, Inc.
721 Beacon St., Loves Park
Lindberg Steel Treating Co.
1975 No. Ruby St., Melrose Park
O. T. Muehlemeyer Heat Treating Co.
1531 Preston St., Rockford
C. U. Scott & Son, Inc.
1510 First Ave., Rock Island

Maryland Tool Company
111-13 Hollingsworth St., Baltimore 2

New England Metallurgical Corp.
9 Alger St., South Boston 27
Porter Forge & Furnace, Inc.
74 Foley St., Somerville 43
Greenman Steel Treating Co.
284 Grove St., Worcester 5

Acme Steel Treating Co.
119 Lieb St., Detroit 7
Anderson Steel Treating Co.
1337 Maple St., Detroit 7
Bosworth Steel Treating Co.
18174 West Chicago Blvd., Detroit 28
Commercial Steel Treating Corp.
6100 Tireman Ave., Detroit 4
Commonwealth Industries, Inc.
5922 Commonwealth Ave., Detroit 8
Michigan Steel Processing Co.
3120 Denton, Detroit 11
Standard Steel Treating Co.
3468 Lovett Avenue, Detroit 10
Vincent Steel Process Co.
2424 Bellevue Ave., Detroit 7
State Heat Treat, Inc.
520 32nd Street, S. E., Grand Rapids 8
American Metal Processing Co.
12000 East Nine Mile Road, Van Dyke

Metallurgical, Inc.
900 East Hennepin, Minneapolis 14

Metallurgical, Inc.
1915 Tracy Ave., Kansas City 8
Lindberg Steel Treating Co.
650 East Taylor Ave., St. Louis 15
Paulo Products Co.
5711 West Park Ave., St. Louis 10

Ace Metal Treating Corp.
611 Grove St., Elizabeth
American Metal Treatment Co.
Highway 25 and IaFayette St., Elizabeth
Benedict-Miller, Inc.
Marin Ave. and Orient Way, Lyndhurst
Bennett Heat Treating Co., Inc.
246 Raymond Boulevard, Newark 5
L-R Heat Treating Co.
107 Vesey St., Newark
Temperature Processing Inc.
228 River Road, North Arlington
Metro Heat Treat Corp.
9 Victoria Place, Ridgefield

Fred Heinzelman & Sons
138 Spring St., New York 12
Alfred Heller Heat Treating Co., Inc.
391 Pearl St., New York 38
Metro Heat Treat Corp.
466 Broome St., New York 13
Lindberg Steel Treating Co.
620 Buffalo Road, Rochester 11
Rochester Steel Treating Works
962 Main Street, E., Rochester 5
Syracuse Heat Treating Corp.
1223 Burnet Ave., Syracuse 3

Cincinnati Steel Treating Co.
Wooster Pike & Mariemont Ave., Cincinnati 27
Queen City Steel Treating Co.
2980 Spring Grove Ave., Cincinnati 25
Ferrotherm Co.
1861 E. 65th St., Cleveland 3
Lakeside Steel Improvement Co.
5418 Lakeside Ave., Cleveland 14
George H. Porter Steel Treating Co.
1273 East 55th Street, Cleveland 3
Reliable Metallurgical Service, Inc.
3827 Lakeside Ave., Cleveland 14
Winton Heat Treating Co.
20003 West Lake Road, Cleveland 16
Dayton Forging & Heat Treating Co.
2323 East First St., Dayton 3
Ohio Heat Treating Co.
1100 East Third St., Dayton 2

Robert Wooler
Limekiln Pike, Dresher
J. W. Rex Co.
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Drever Company
220 West Cambria St., Philadelphia 33
Lorenz & Son
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Metlab Company
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Wiedemann Machine Co.
4272 Wissahickon Ave., Philadelphia 32
Ferrotherm Company
4911 Butler St., Pittsburgh
Pittsburgh Commercial Heat Treating Co.
49th St. and A.V.R.R., Pittsburgh 1

Cook Heat Treating Co., of Texas
6233 Navigation Boulevard, Houston 11

Allied Metal Treating Corp.
Highway K & 60th Street, Kenosha
Hushek Metal Processing Co.
1536-40 West Pierce Street, Milwaukee 4
Metal Treating, Inc.
720 South 16th St., Milwaukee 4
Supreme Metal Treating Co.
4440 West Mitchell St., Milwaukee 14
Thurner Heat Treating Co.
809 West National Ave., Milwaukee 4
Wesley Heat Treating Co.
1333 West Pierce Street, Milwaukee 4
Wesley Steel Treating Co.
1301-1403 West Pierce St., Milwaukee
Harris Metals Treating Co.
1635 Murray Ave., Racine
Spindler Metal Processing Co.
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Wesley Metal Treating Co.
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TING INSTITUTE **271 NORTH AVENUE**
NEW ROCHELLE, NEW YORK

INSTITUTE NEWS

1954 ANNUAL MEETING

Research, Profit Sharing, Productive Maintenance and greater cooperation with tool steel manufacturers were the principal subjects under discussion at the recent 1954 Annual Meeting. This, the 36th consecutive meeting of the Institute was held at the Hotel Sheraton, Chicago, Ill., October 29th through 31st.

Speakers addressing the group during the three day meeting were: Leslie S. Fletcher, Research Director, Research Fund, ASTE,—*"Possible Cooperation Between MTI and ASTE Research Fund to Establish Program Which Might Lead to Work of Mutual Benefit on Some Phase of Heat Treating Operations"*; C. B. Post, Chief Metallurgist, Carpenter Steel Company,—*"How Steel Manufacturers and Commercial Heat Treaters Can Work Together to Their Mutual Benefit"*; D. R. Siewert, Mgr. Chicago Service Shop and H. E. Scarbrough, Heating Specialist of General Electric Company presented a new film entitled, *"Productive Maintenance"*; A. T. Ridinger, President, Metallurgical, Inc., and E. P. Tang, Accounting firm of Touche, Niven, Bailey and Smart,—*"The Operation of a Profit Sharing Plan in a Commercial Heat Treating Plant."*

During the meeting President C. M. Cook, Cook Heat Treating Co., Houston, Texas, was reelected as were Vice President C. R. Weir, Commonwealth Industries, Inc., Detroit, Mich., and Treasurer Lloyd G. Field, Greenman Steel Treating Co., Worcester, Mass.

Three new directors were elected: Arthur Eklund, Eklund Metal Treating Inc., Loves Park, Ill., Howard N. Bosworth, Bosworth Steel Treating Co., Detroit, Mich., and A. E. Leidig, Hollywood Heat Treating Co., Los Angeles, Calif.

The remaining directors whose terms did not expire this year are: H. L. Miller, B-M Heat Treating Co., Lyndhurst, N. J., C. F. Graham, Metal Treating, Inc., Milwaukee, Wis., and K. U. Jenks, Lindberg Steel Treating Co., Melrose Park, Ill., and Past President A. M. Cox, Pittsburgh Commercial Steel Treating Co., Pittsburgh, Pa.

An outstanding event at this year's meeting was the presentation of the first Annual MTI Achievement Award to Ken U. Jenks Secretary-Treasurer, Lindberg Steel Treating Company. Mr. Jenks, and the Cost Accounting Committee, were given the award in recognition of the outstanding accomplishment of this MTI Committee. The Committee presented four papers during the year outlining a complete cost accounting system for commercial and in-plant heat treating operations. Reprints of the papers are now available.

SBA Report

The National Council, composed of fifty-two small business men from all sections of the country, convened to discuss the problems of small business and to make constructive recommendations for their solution.

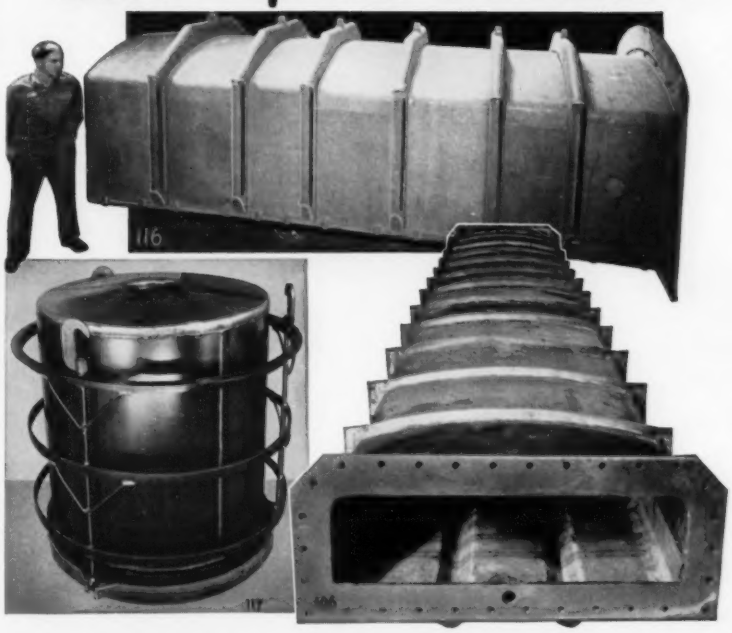
A. D. Bach, New England Metallurgical Corp., member of the National Council of Consultants to SBA, reports on recent Washington meeting.

The Consultants, mostly small business men or small bankers, journeyed to Washington at their own expense to help formulate a program that would create more favorable conditions so that small firms can continue to contribute their share to American economic growth.

The meeting of the Council, which was held in the historic Indian Treaty Room where President Eisenhower regularly holds his press conferences, was opened by Administrator Wendell B. Barnes, who made an address of welcome and then outlined the purpose and the program of the two day meeting. After the opening address, Under Secretary of the Treasury, W. Randolph Burgess, explained how the Eisenhower Administration had halted the trend "toward centralized government, which brought about mounting expenditures, higher taxes, larger deficits and inflation" and he continued "the objective (of the Administration) is a dynamic

(*Continued next page*)

Having . . .
Atmosphere trouble?



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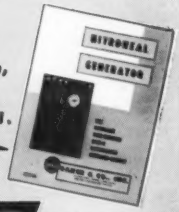
Applications include bright annealing, heat treating and furnace brazing of stainless steel, low and high carbon steels and non-ferrous metals.

Write for free, informative booklet No. 21.



BAKER & COMPANY, INC. PRECIOUS METALS

113 ASTOR ST., NEWARK 5, N. J.

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INSTITUTE NEWS (Cont'd)

and growing economic life and rising living standards."

After the general meeting, the Council was divided into three working committees where the details of the SBA program were discussed and formulated.

The three committees are the Finance Committee, the Procurement and Technical Committee, and the Committee on Management Assistance. The committees carried on their work in the morning and afternoon of the first day and made a formal report to the entire group the next morning. The entire Council group either delated or approved the recommendations made by the individual committees and these were filed with Administrator Barnes.

Recommendations Given

Some of the more important recommendations submitted to Administrator Barnes were as follows:

That the present authority of the Regional Directors be increased to permit them to approve participation loans in an amount not exceeding $100,000 to any one borrower providing that the participating institution's share in the loan is not less than 25% of the loan and providing that not less than 50% of the bank's participation represents new money.

That Regional Directors arrange to provide banks in their area, especially the smaller banks, with more information on the SBA Financial Assistance Program.

That SBA Form 4 (Application for a Direct Loan) and SBA Form 6 (Application for Participation Agreement) be consolidated to simplify and make easier the submission by banks of necessary information in support of a loan application.

That SBA continue its policy of *not* making unsecured loans, as this type of loan is not properly within the Government's scope of operations.

That small business concerns be given whatever assistance possible in obtaining needed equity capital by maintaining lists of available sources of such capital in their areas and through publications on equity financing possibilities and methods.

That the members of the Council are interested in, and desire to be helpful in, the issuance of certificates of competency.

That the Council is concerned with the effect that certain import tariffs are having on the small business community of the country; and recommends that appropriate action be taken to study the current effect of these import tariffs; and to endeavor to arrive at a solution which will afford relief to the United States small business men.

That a survey should be conducted by the Regional Offices to encourage small and big business concerns to purchase their material and supplies *locally* to the maximum extent practicable.

That the Regional Offices make a concerted effort to get their production and procurement men out on visits to industrial areas within the region. These visits can be very effective if properly coordinated and timed. Generally, the local Chambers of Commerce will assist in furnishing space for meetings and interviews.

That appropriate small business concerns receive information on all large prime contracts which have been awarded by the Government.

That additional Procurement Information Centers be added to those Regional and Branch Offices deemed appropriate.

That SBA Regional Offices should extend procurement activities to include State and Municipal Procuring Agencies.

That wider distribution of management and technical pamphlets be sought through trade associations, chambers of commerce, banks, and similar centers.

(*Continued on page* 28)

Rolock makes
this Dump Bottom Basket...
Built to live
in a heat treating casket.

Though its days are white hot
And more corrosive than not,
It always gives
more than they ask it!

...it's wrought Inconel

How much *can* you ask of wrought Inconel® in high temperature applications?

You get a hint of the design possibilities of Inconel from this dump bottom furnace basket made by Rolock, Inc., Fairfield, Conn.

It's designed to quench large loads of small parts quickly and uniformly. Weighing only 157 pounds, it must handle 1200 pounds of work.

When used, the basket is dropped, fully loaded, into a pit-type furnace. There it remains in 1725°F. carburizing or 1000°F. nitriding atmospheres. Then it's quickly removed and dumped. Time after time, the cycle is repeated, yet the basket must retain its rapid dumping action.

Wrought Inconel has the strength, and the heat and corrosion resistance, to take all this easily. In addition, Inconel is easily fabricated and welded by familiar processes.

To help you take full advantage of the possibilities of Inconel in high temperature service, Inco has prepared a helpful high temperature work sheet. Write for a copy, today.

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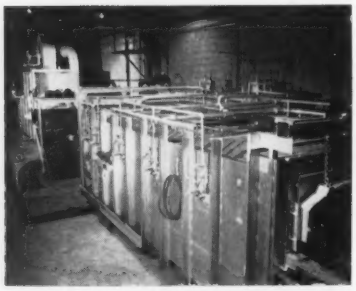
Inconel... *for long life at high temperatures*

Inco Nickel Alloys

High-Production Installation at Commonwealth Industries

Believing strongly that high-production equipment has a place in commercial heat treating has led Commonwealth Industries, Inc., Detroit, Mich., to add to its otherwise large, continuous type production facilities, the equipment shown below.

The furnaces comprising the pictured production unit are of the non-atmosphere type. The unit to the right is a high heat (1450°F.-1650°F.) furnace, with a 55" wide, cast nickel alloy belt; next are quench conveyors, and to the left is the draw furnace (300°F.-1350°F.), both furnaces having two zone automatic temperature controls. In operation, a minimum of handling is assured by the separate conveyor systems, discharging parts from the hardening furnace to the quench conveyor, then to the draw furnace conveyor, and, finally, from there to the containers for finished work. In processing very large or very heavy parts, it may be necessary to quench slowly or by hand. This is readily done by means of an overhead monorail hoist.



In the foreground is the high-heat furnace; tempering furnace can be seen in the background.

A unique feature of the new installation is the quench arrangement of two ten foot deep, 4,000 gallon quench tanks, along with their conveyors, mounted side by side on railroad trucks which run on three rails. The whole assembly may be moved back and forth, depending upon which quench medium is to be used. One tank contains an oil bath, and the other is for caustic, brine or water quenching. The coolers for the quench solutions are mounted on the building roof and are of the forced air cooled, radiation type. The quench tanks and coolers are connected by flexible, four inch, high pressure hose through separate high volume pumps, which assure good circulation and quench agitation.

Typical parts processed through this equipment.

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It's this simple: mark the workpiece with the proper Tempilstik°. When the mark melts, the specified temperature has been reached.

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to control working temperatures in:

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- flame-cutting
- tempering
- forging
- casting
- molding
- drawing
- straightening
- heat-treating in general

$2 each

gives up to 2000 readings

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113	263	400	950	1500
125	275	450	1000	1550
138	288	500	1050	1600
150	300	550	1100	1650
163	313	600	1150	1700
175	325	650	1200	1750
188	338	700	1250	1800
200	350	750	1300	1850
213	363	800	1350	1900
225	375	850	1400	1950
238	388	900	1450	2000

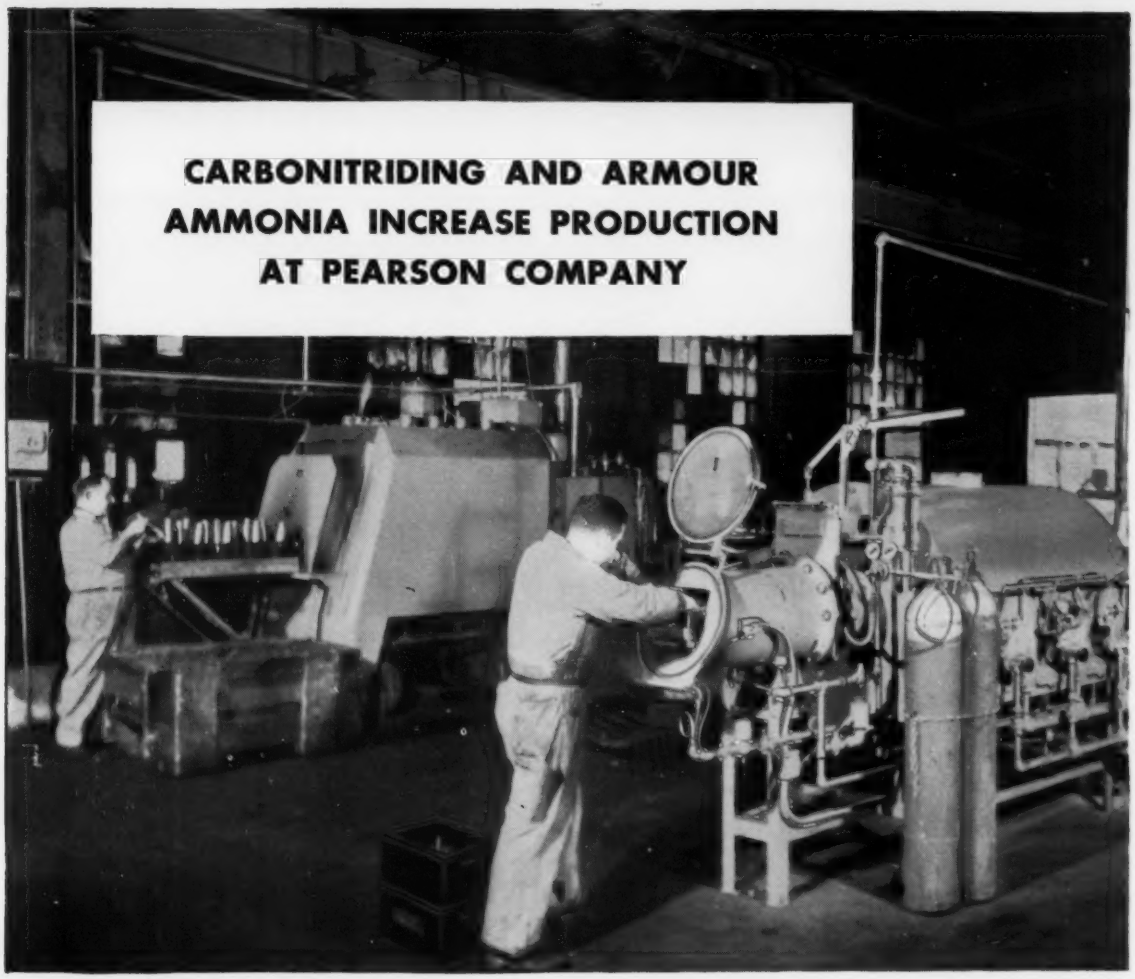
Also available in pellet or liquid form

FREE —Tempil° "Basic Guide to Ferrous Metallurgy" — 16¼" by 21" plastic-laminated wall chart in color. Send for sample pellets, stating temperature of interest to you.

Metal & Thermit Corp. 100 E. 42nd Street, New York 17, N. Y.

C. U. Scott Awarded Honorary Life Membership

During the recent Annual Meeting, President Cook awarded C. U. (Charlie) Scott a certificate of Honorary Life Membership in the Metal Treating Institute. Mr. Scott served as the first President of the Institute in 1933 and, although retired from his company, C. U. Scott & Son, Inc., Rockford, Ill., he has expressed his desire to maintain contact with the Institute and its members.



CARBONITRIDING AND ARMOUR AMMONIA INCREASE PRODUCTION AT PEARSON COMPANY

New processes prove more efficient, safer for metal treating

Those carbonitriding and brazing furnaces above mean greater production and safety at the Pearson Industrial Steel Treating Company in Chicago. And Pearson specifies Armour's pure, dry ammonia and dependable service for their carbonitriding.

All through the metal treating field, plants are using every improved process they can to provide their clients with better work. Since many of these new processes require ammonia, more and more companies like Pearson are calling on Armour ammonia and service for best results.

Carbonitriding has reduced costs and increased safety in many plants. And Armour men were there in many cases to give advice and help on installations. Those men in Armour's Technical Service Department are equipped and ready to help you in your installation.

Since 1947 Armour has sponsored a fellowship at the Massachusetts Institute of Technology for the study of carbonitriding and other modern metal treating processes. That knowledge is basic research, and available to you.

The booklets offered below will show you how to put this knowledge to work in your plant. Write today for free copies. If your ammonia problem is unusual or pressing, write us giving full details of your requirements.

Clip and mail this today!

- ☐ "Applications of Dissociated Ammonia"
- ☐ "Ammonia Installations for Metal Treating"
- ☐ "The Nitriding Process" ☐ "Carbonitriding"

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HEAT TREATING HINTS

Distortion Tests Must Be Used With Care

Distortion of tool steel in heat treatment is one phase of toolmaking which is least understood. Some of the distortion test data which is being published, rather than shedding light on this subject, adds to the confusion.

Typical of distortion tests which have little value, and are actually misleading, are those which are run on small diameter bar stock, such as a ¾ in. round test piece, 1 in. long. The results of distortion tests on such specimens are reported as the change in length which occurred in the hardening heat treatment. The question might well be asked: What is wrong with such data? The answer is that there is nothing wrong with the data—it tells what will happen when a piece of steel of the dimensions mentioned is hardened. The next logical question is: How do you use this data to predict size changes of tools of other sizes? Herein lies the rub! People who publish such data do not tell the reader how to use it for tools of sizes other than ¾ in. diam. x 1 in. long. However, the inference is very strong that the distortion figure on the 1 in. piece can be used as a factor on pieces of different sizes, i.e., a 5 in. piece will change 5 times as much, and a 10 in. piece will change 10 times. Most emphatically, this is not so! Depending upon the size and shape of the pieces being hardened, some dimensions will expand and some will shrink. The factor cannot predict this and therefore is misleading. The data obtained on the test piece is of value only in connection with the hardening of tools of the size and shape of the test piece itself, which is obviously of limited value.

Unfortunately, there is no simple test specimen which will enable prediction of size changes in tools of various sizes and shapes. This is due to the fact that the size and shape of the tool itself is the most important factor involved in the distortion resulting from heat treatment.

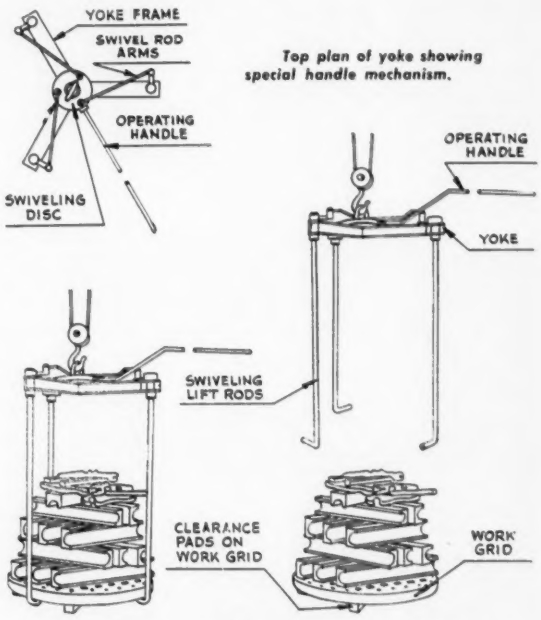
Tool Steel Topics #76
Bethlehem Steel Company
Bethlehem, Pa.

Swivel Fixture Speeds Heating; Saves Fuel

A Mid-Western foundry built a novel "Swivel Fixture" used to hold work heat treated in their pit-type production hardening furnace. This fixture makes the heat treater's work easier, speeds heating, and saves fuel.

As shown below, the fixture consists of a top yoke provided with a special handle. This handle controls the revolution of the three "swiveling lift-rods" that carry the weight of the loaded grid.

The lower or grid-ends of the "swiveling lift-rods" are bent to a 90° angle or hook. This hook part of the rods fits under, and holds the grid and its load. As can be seen the grid has clearance pads on the underside which provide clearance for the movement of the hook part of the lift rods.



Fixture with yoke and swiveling lift-rods engaged (left) and disengaged (right).

The complete fixture carrying the work load is lowered into the furnace work chamber by means of an overhead crane or hoist. By moving the yoke control-handle the "swiveling lift-rods" revolve and are disengaged from the underside of the grid. The yoke and lift rods are then removed from the furnace work chamber leaving only the grid and its load in the furnace. This eliminates the necessity of heating and quenching the yoke and lift rods.

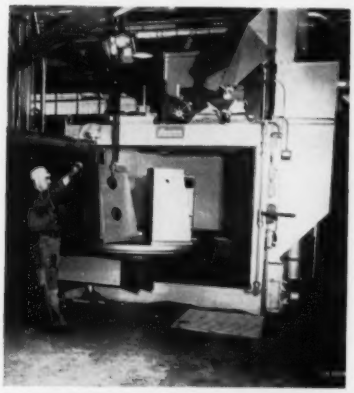
Advantages of the fixture are fourfold: (1) The heat treater's work is made easier. (2) Speed of heating is increased and fuel consumption is reduced, because charge reaches quenching temperature quicker when it is not necessary to heat yoke and lift rods. (3) Quenching wear and tear on yoke and lift rods is eliminated. (4) If yoke and lifting rods remain in furnace, they would have to be made of costly alloy, as only alloy will sustain heavy loads at elevated temperatures.

Heat Treating Hints
Vol. VI, No. 1
Lindberg Engineering Company
Chicago, Ill.

News to Heat Treaters (Cont.)

Table-Type Blast Cleaner

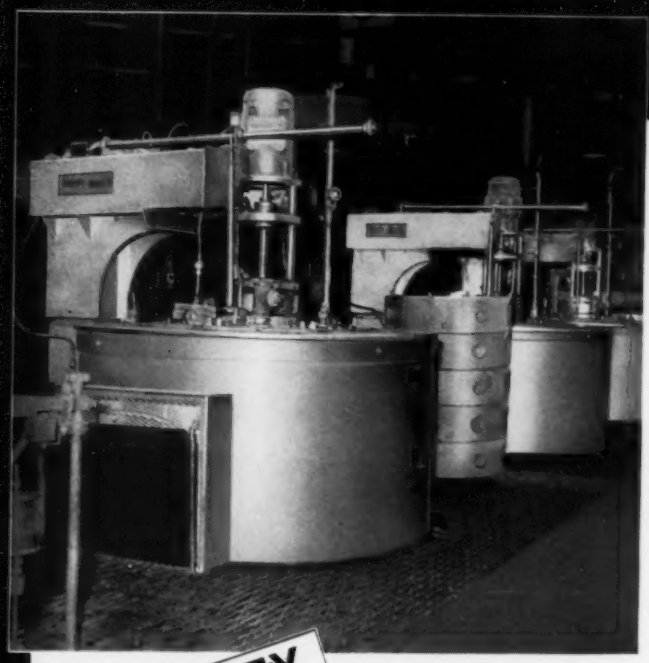
A new kind of table-type airless blasting machine for various cleaning and peening applications is being announced by American Wheelabrator & Equipment Corp., 1175 South Byrkit St., Mishawaka, Indiana. The machine, called a 72" Wheelabrator Swing Table, is distinct from other swing-table-type airless blasting machines in that it requires no pit at all for the abrasive hopper, whereas other types in the past have required them. The whole machine is built for floor level installation.



The machine has a 40" work height clearance and is meant to handle a wide range of work, like that found in job shops. Intended for cleaning castings, forgings, heat treated parts, weldments, or stampings, the table can hold either a few large pieces, or hundreds of small parts at one time. Other applications include cleaning work in connection with reconditioning and rebuilding, like gas and water meters, valves, plant machinery, power and other plant engines, electric motors, automotive parts, or caked and coated centrifuge baskets. Still others are the deflashing of plastics and die castings and the preparation of metallic parts for galvanizing, rubberizing, glass coating, painting, enameling, and plasticizing. Metallic parts can be peened in it to increase their fatigue lives.

FEDERAL BEARINGS CO. *has*

ACCURATE Carbon CONTROL



WITH A HEVI DUTY®

Vertical Retort Furnace

Federal Bearings Company of Poughkeepsie, New York accurately controls the carburizing of certain bearing races in a Hevi Duty Furnace.

Multiple Zone Control of radiant type heating elements assures even heat distribution from top to bottom of the load.

Forced Circulation assures that the carburizing atmosphere reaches all surfaces of even the most dense loads.

You, too, can produce consistently uniform results if you specify Hevi Duty Vertical Retort Furnaces for Carburizing, Nitriding, Dry Cyaniding and Bright Annealing.

Write for Bulletin HD-646.

HEVI DUTY ELECTRIC COMPANY

MILWAUKEE 1, WISCONSIN

Heat Treating Furnaces... Electric Exclusively

Dry Type Transformers *Constant Current Regulators*

News to Heat Treaters (Cont.)

ASTE Research Fund Sponsors First Project

The Research Fund Committee of the American Society of Tool Engineers has recently let its first research contract. This contract was placed with Columbia University for a study into the distribution of heat generated during the cutting of metal. This investigation shows promise of leading to practical results that can be immediately applied. It will attempt to fill in some of the blanks in metal-cutting technology and lead to more realistic specification of tool forms, cutting angles, and speed, feed and depth of cuts.

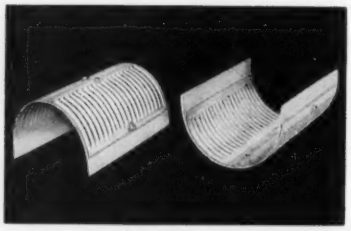
The Columbia heat and mass flow analyzer (an analogue computer) will be applied during this investigation because of the ease with which the effects of individual variables can be studied. Use of the analyzer was suggested by its successful application in determining core temperatures during casting and plotting heat flow during quenching.

The present investigation will comprise several phases. The first step will consist of computing temperatures in a theoretical workpiece under various cutting conditions. Results of these computations will be evaluated to determine which of the many cutting variables are main contributors to the final temperature pattern. The final step will be an attempt to actually measure temperatures under conditions identical with the hypothetical setup. This work will probably require special measuring techniques in view of the rapid changes in temperature that will be encountered.

Heat Transfer Units

Curved Thermo-Panels solve many unusual heat exchange problems according to Thermo-Panel Division, Dean Products, Inc., 616 Franklin Ave., Brooklyn, N. Y. Thermo-Panels, they have announced, are available not only in flat plates but in special shapes such as illustrated here.

With this type of Thermo-Panel it is said possible to place them around tanks, under troughs, etc.; they are also incorporated in the construction of tanks, vats, kettles, where they are used as part of the structural elements of the vessels.



Thermo-Panels are also available in special shapes such as L's and cylinders and in a wide range of materials, including steel, stainless steel, Monel and other special alloys.

Centrifugal Dryer

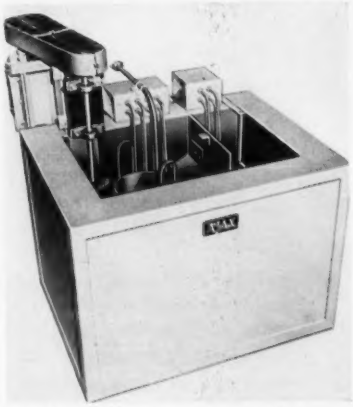
Metal Finishing Manufacturing Corp., 89 N. 11th St., Brooklyn 11, N. Y., is releasing for general distribution a new PLACO Centrifugal Dryer.

Boasting a speed of 865 r.p.m., an increase of more than 30% over other standard units in general use, the dryer will spin up to 50 lbs.

The engineered design is claimed to lessen operator fatigue. Only 32½ inches high in over-all height, the unit occupies 25 inches by 43 inches of floor space. All parts are accessible for inspection and a minimum of maintenance is required. A machined brake plate applies a leverage of 4½:1 on a 3 inch brake, which makes for quick and effortless stoppage. In addition, a built-in centering device, consisting of machined rods and rings, holds the 12″x12″ basket in the best dynamic balance.

Salt Bath Quench Furnace

Ajax Electric Company, 940 Frankford Ave., Phila. 23 Pa., has announced the development of a new salt bath isothermal quenching furnace, the Ajax Cataract Quench Furnace, having unusually high quenching power. For the first time, it is said, because of this new furnace design, the quenching power of molten salt (400°F and above) equals or surpasses that of agitated oil (100°F to 150°F).



With this new quench furnace it is now possible to heat treat by the isothermal quenching process, steel products that were heretofore considered "borderline" cases, those that could not be austempered or martempered. Cataract quenching increases the cooling rate in the critical range 1300°F—1000°F thus getting past the nose of the "S" curve. Thus, any steel that can be satisfactorily hardened by oil quenching can now be either martempered or austempered in a Cataract

(*Continued on page 35*)

Heinzelman Installs Another . . .

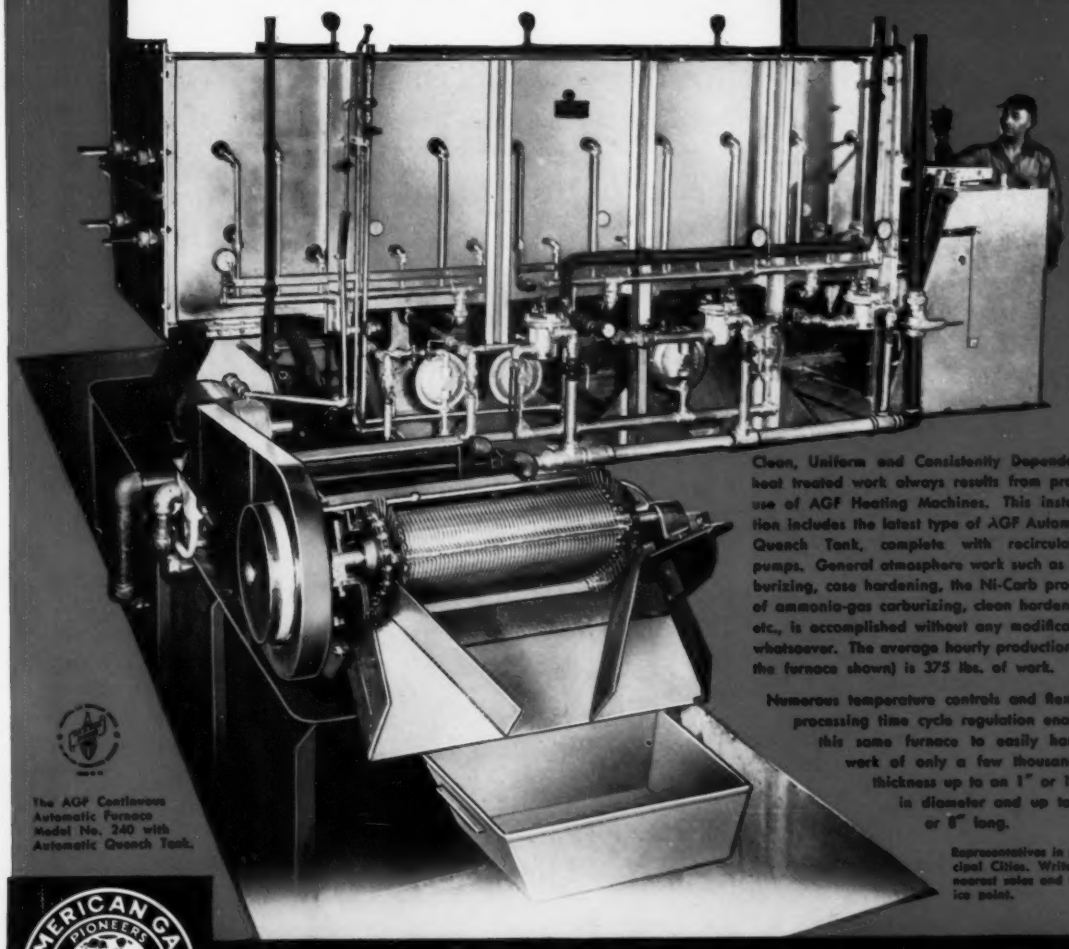
AGF HEAT TREATING FURNACE

"AGF Customer of Long Standing"

Fred Heinzelman & Sons—New York—Since 1915—one of America's oldest and most dependable commercial heat treaters—after using a smaller AGF machine of the same type, liked its adaptability so much that they bought the newest AGF Reciprocating Furnace with the stationary muffle and moving hearth.

The most discriminating buyer of heat treating equipment is a commercial heat treater—a specialist whose success depends on selecting the Right Furnace. Their choice — Furnaces made by AGF because they get:

- HIGH PRODUCTION OUTPUT
- FLEXIBILITY
- UNIQUE CONSTRUCTION
- QUIET OPERATION
- AND MANY OTHER FEATURES



The AGF Continuous Automatic Furnace Model No. 240 with Automatic Quench Tank.

Clean, Uniform and Consistently Dependable heat treated work always results from proper use of AGF Heating Machines. This installation includes the latest type of AGF Automatic Quench Tank, complete with recirculating pumps. General atmosphere work such as carburizing, case hardening, the Ni-Carb process of ammonia-gas carburizing, clean hardening, etc., is accomplished without any modification whatsoever. The average hourly production (of the furnace shown) is 375 lbs. of work.

Numerous temperature controls and flexible processing time cycle regulation enables this same furnace to easily handle work of only a few thousandths thickness up to an 1" or 1½" in diameter and up to 6" or 8" long.

Representatives in principal Cities. Write for nearest sales and service point.

AMERICAN GAS FURNACE CO. PIONEERS 1878

AMERICAN GAS FURNACE CO.

808 LAFAYETTE STREET — ELIZABETH 4, N. J.

HEAT TREATING ABSTRACTS

Liquid Carburizing

By Thomas M. Dougherty
(Metal Progress, August, 1954)

In the early postwar period, 21 batch-type furnaces were being used for pack carburizing bearing raceways at the Bearings Co. of America Div., Federal-Mogul Corp. 9 to 12 hours were required at the carburizing temperature (1750° F.) for each load, plus the additional time and labor required for cooling, reheating, quenching and tempering.

An increase in the heat treating capacity of the company was required along with greater metallurgical control and a reduction in the carburizing-hardening time cycle. To meet these needs, two liquid carburizing furnaces were installed with stabilizing pots, liquid tempering baths, quench and rinse tanks. Two lines were set up in direct line with blanking, coining and machining equipment.

With this equipment, carburizing time has been reduced to a maximum of six hours for a 0.060" case depth. Case depth requirements vary and on some parts only a 0.015" case depth is needed. After carburizing, parts are "stabilized" in a bath at 1450° F. to reduce distortion due to quenching. A 10% brine solution is used for the quench. Tempering, in a salt bath, is done at 370° F. for one hour.

As a result of the new installation the maximum time cycle for all operations is 7½ hours and production has been markedly increased, while permitting a decrease in man-hours required.

Simple Test Measures Quenching Power of Salt Baths

By R. F. Harvey
(The Iron Age, April 8, 1954)

Several methods of determining the quenching power of hot salt baths are discussed. Those available up to now, however, lacked the desirable characteristics of convenience and being a true measure of hot salt under production conditions. The author describes a new test specimen devised for use in production equipment which provides hardenability readings on varying section sizes. Basically, the test piece is 4" in diameter by 3" long with an eccentric hole 2½" in diameter drilled through. The minimum section is thus ¼" thick and the maximum 1¼" thick.

After heating and quenching an average of five hardness readings are taken on the O.D. at increments of ⅛" in thickness. In the tests described, AISI 52100 steel was used, thus a standard speci-

(Continued on page 36)

SPECIALISTS at Your SERVICE...
WITH THE ONLY ORGANIZATION EXCLUSIVELY DEVOTED TO ROLLED HEAT-RESISTANT ALLOYS
SHEETS
FLATS
PLATES
ROUNDS
SQUARES
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PIPE
WIRE BY COIL
NUTS
WELDING ROD
Finest Quality Metals... The Result of Specialized Experience... Unsurpassed By Any Other Organization
Not One Heat-Resisting Alloy...But All Necessary Analyses Available
ROLLED ALLOYS
CARRIED IN
TYPE 330 . . 35 Ni–15 Cr–1¼ Si
TYPE 309 . . . . . 25 Cr–12 Ni
TYPE 310 . . . . . 25 Cr–20 Ni
TYPE 430 . . . . . 17 Cr
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Heat and Corrosion Resistant Alloy Specialists
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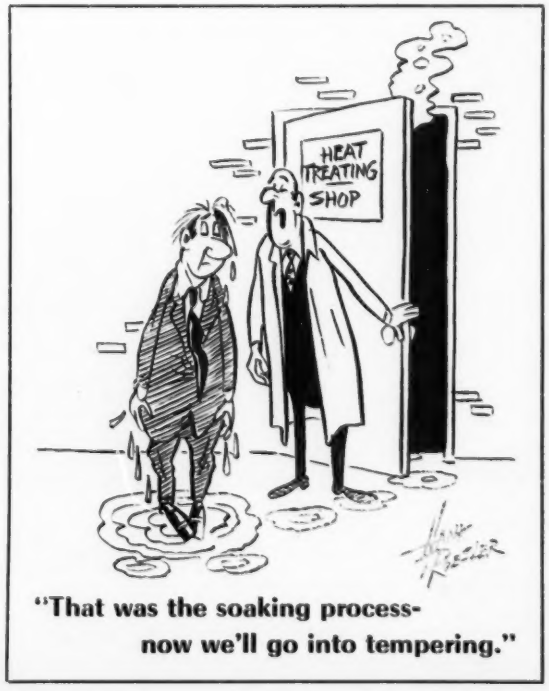


"That was the soaking process-
now we'll go into tempering."

News to Heat Treaters (Cont.)

Quench Furnace.

The secret to the increased quenching power of the Cataract Quench Furnace is the uniform, high velocity downward flow of salt confined within a special quench header.

Instrument Usage

In this era of automatic process control, many hold the view that the so-called process industries have long been far out in front in demonstrating what can be accomplished in production with instruments and controls, an impression shown to be contrary to fact by a survey of 200 firms by the Marketing Research Department of Sweet's Catalog Service, division of F. W. Dodge Corporation.

Sweet's investigated instrument usage by industry in the test cities of Berkeley, Calif., Sacramento, Calif., Rockford, Ill., Erie, Pa., Pawtucket, R. I., and Fort Worth, Texas—analyzing its findings (1) by industry categories (process industries, mechanical industries and utility operations), (2) by the variables measured (temperature, flow, liquid level, pressure, combustion, speed, weight) and (3) by type of instrument (indicating, recording and controlling).

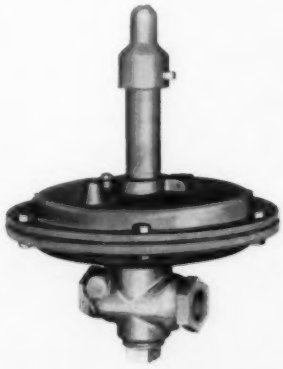
Surprisingly enough, the measurement and control of temperature, flow and other variables was reported with about the same frequency in the mechanical industries as in the process industries. Slightly more instrumentation was evidenced in the mechanical industries in the measurement and control of temperature, pressure, combustion, speed and weight. Flow and liquid level measurement and control is more prevalent in the process industries. As for automaticity, the mechanical industries showed a thin edge in applying full controlling instruments, while the utilities seemed to be the most avid users of recording equipment.

On an overall basis the trend toward scientific process regulation and quality control was amply shown. Every single respondent indicated the use of instruments or controls in some manner, 98% indicating, 87% recording and 82% controlling.

A question having to do with the job function of the individuals who take part in the selection and purchase of instruments and controls disclosed that the specific title of plant engineer was mentioned more than any other, and that, in most cases, the same individuals who take part in determining the types of instruments needed also participate in the selection of the makes to be purchased.

Low Pressure Regulator

The Paulsen-Johnson Company, 1647 Eddy Road, Cleveland 12, Ohio recently announced development of a new ¾" size, low pressure, demand-type, air and gas regulator capable of passing as much as 600 cubic feet per hour .6 sp. gr. gas at 4" WC pressure drop. This new valve features accurate regulation to within 5/100" WC throughout its full range of operating pressures.



1¼" piping is recommended on the outlet side; this arrangement permits economical operation of the unit at its high capacity rating. This new model completes the range of sizes of the company's zero regulators from ¾" to 3" with rated capacities from 1 to 10,000 cubic feet per hour.

These pressure regulators are said to be suitable for straight suction service on heating systems equipped with aspirating mixers, or they can be used on cross-connected systems as a proportioning device. In this instance, the gas pressures are automatically balanced against each other and varying proportions can be established thru metering orifices in each line.

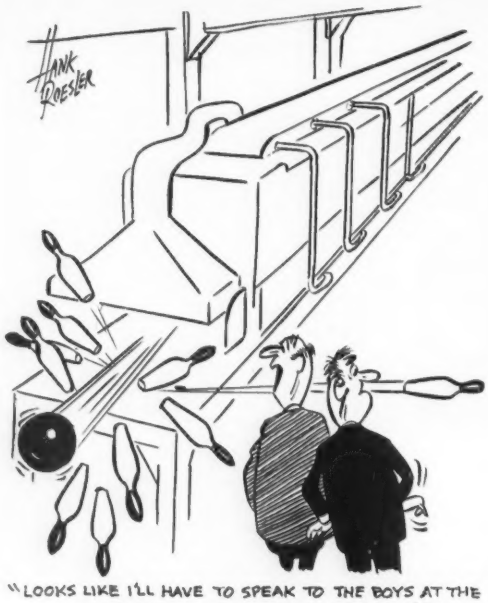
Gas-Air Mixer

A new gas-air mixing and carbureting machine, the Waukee MIXOR, has just been announced by the Waukee Engineering Company, Inc., 407 East Michigan Street, Milwaukee 3, Wisconsin.

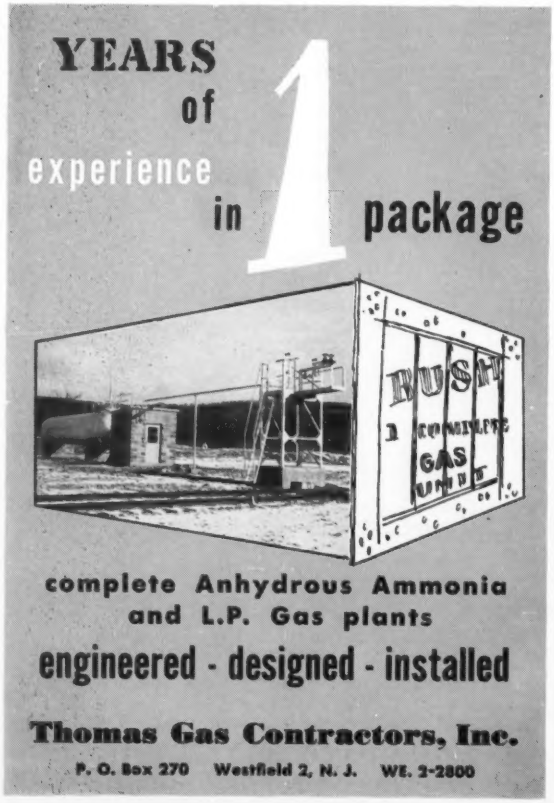
The unit is supplied as a complete package with vane-type compressor, standard 1750 R.P.M. motor drive through V-Belt, motor adjusting base, air filter, pressure relief valve, gas zero governor, lubricator, carburetor and flo-meters all mounted and factory piped.

The MIXOR is a compact, self-contained unit that eliminates the assortment of projecting pipes generally found in a machine of this sort. Servicing has been greatly simplified, the carburetor can be completely disassembled, cleaned and put back together without disturbing the

(Continued on page 37)



"LOOKS LIKE I'LL HAVE TO SPEAK TO THE BOYS AT THE OTHER END OF THIS FURNACE, AGAIN!"



HEAT TREATING ABSTRACTS (cont'd)

men and material offer results interpreted only as dependent on quenching power.

Tests were conducted at the Brown & Sharpe plant as well as six other commercial heat treating installations. Hardness traverses from these tests were plotted against section thickness along with hardness readings from one violently agitated bath and one without agitation, for comparison. Agitation showed a great effect on the depth of hardness and maximum hardness attained, as would be expected.

The test specimen described offers an inexpensive, quick method of comparing quenching power and may find general use in heat treating operations involving hot salt quenching.

The Blast Cleaning of Metal Surfaces

By Victor F. Stine

(Metal Progress, June, 1954)

There are six general categories of blast cleaning methods; these are: *1. sand-blasting*—silica sand or synthetic abrasive is blown by compressed air; *2. wet sand-blasting*—silica sand is mixed with water and blown by compressed air; *3. shot-blasting*—metal pellets are propelled by centrifugal force or compressed air; *4. grit-blasting*—angular metal pellets propelled by centrifugal force or compressed air—used where good bonding is required; *5. hydro-sand-blasting*—silica sand and water, propelled by water under pressure—used for removing cores or cleaning large surfaces; *6. liquid-blasting*—very fine abrasive (100 to 5000 mesh) in water propelled by compressed air at 40 to 80 psi.

There are a great number of machines available for blast cleaning, each with individual ramifications. However, all these machines can be classified as one of three types according to the basic principle used. These are: *suction blast, gravity blast and direct-pressure blast.*

The selection of a proper abrasive for use in any type of equipment is dependent largely upon cost versus finish desired. Cast iron shot is commonly used because of low cost but it offers shorter life and considerably greater wear on equipment than other types of shot. Cast iron grit, the product of crushed shot has good cutting qualities providing "keying" for bonding various finishes. Malleable or annealed shot can be made to controlled hardness and toughness specifications thus offering longer life to offset higher initial cost. Steel shot has a 200 to 400% greater life than chilled iron abrasives and thus lower overall unit cost.

Abrasive sizes are graded according to SAE standards and are such that one "body size" includes several screen sizes and the percentage of finer sizes, within a particular body size, increases in proportion with the fineness of abrasive. These finer sizes are not desirable, but must be accepted.

News to Heat Treaters (Cont.)

ratio setting.

This unit may be used on gas generators of the endothermic and exothermic types. It is also useful for producing gas-air mixtures for flame hardening, torch brazing, torch annealing and soft metal melting. Made in three sizes, nominally rated for mixing capacity at 400 ft. per hour, 600 ft. per hour, and 1500 ft. per hour. Available for city gas, natural gas, propane, butane, and air.

Schwerin Manages Gas Machinery Furnace Division

The Gas Machinery Company, Cleveland, Ohio, has announced the appointment of Charles H. Schwerin as manager of the Industrial Furnace Division.

In his new capacity, Mr. Schwerin will direct engineering, sales, manufacturing and installation of all GASMACO Industrial Furnaces which include rotary hearth, pusher type, car type, reheat furnaces, melting furnaces, wire patenting furnaces, clean forging furnaces, high temperature roller hearth and high temperature radiant tube fired furnaces.

Mr. Schwerin has had 19 years' experience in the industrial furnace field. His previous position was manager of sales and sales engineering for the George J. Hagan Company. He is one of the early pioneers of the application of automation to the heat treatment of steel, iron and aluminum. He initiated the use of automatic rotary hearth furnaces for heating slabs for plate mills and for heating blooms for rolling mills.

Ajax Representative

Ajax Electric Company, Phila., Pa., has announced the appointment of Mr. A. C. Towne, Jr., 3041 Bailey Ave., Buffalo, New York, as representative for the upper New York State area. Mr. Towne, and his associate, Mr. C. Percival, Jr., will also represent

ROLOCK

HEAT AND CORROSION RESISTANT

FABRICATED ALLOYS

FORD MOTOR COMPANY

SAVES 1/2 HOUR IN HEAT TREATING CYCLE

Photographs above show two similar cycles through a roller hearth carbo-nitriding furnace at 1560° F., followed by oil quench . . . at the Rouge Dearborn Engine Plant. (Left) Rolock fabricated hairpin fixtures and pressure-welded separator screens carry Crankshaft Sprockets, while (right) Rolock fabricated stacking-type fixtures handle Oil Pump Shafts (long and short).

In both instances, through individual positioning, cycle times have been reduced ½ hour from bulk loading times: for the sprockets, from 3 hours to 2½ . . . and, for the shafts, from 2 hours to 1½. Optimum circulation of gasses and quenching oil around parts improves quality . . . positioning shafts vertically minimizes run-out . . . loading and unloading are simplified.

Rolock fabricated, engineered-to-the-job heat treating equipment cuts costs . . . betters your competitive position . . . improves your products. Rolock engineers expect, and welcome, tough jobs . . . and are solving them for the country's leading metal-working plants. Our Catalogs B-8 and B-9 are packed with ideas you can use. Send for them today.

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JOB-ENGINEERED for better work
Easier Operation, Lower Cost

9RL54B

News to Heat Treaters (Cont.)

Surface Treatment For Aluminum

Proseal #16, a new chromate conversion protective coating for aluminum and aluminum alloys, has been announced by Promat Division, Poor & Company, Waukegan, Illinois.

Said to effectively inhibit corrosive action between paint and aluminum, the new protective film meets requirements specified in MIL-C-5541 for military aircraft applications and, according to the manufacturer, is designed for use on any application where extruded, forged, wrought or cast aluminum and its alloys are used.

Results of professional laboratory tests indicate that no changes in physical properties have been noted on panels treated with Proseal #16 after 500 hours of exposure to 20% salt spray solution at 95°F.

Reported effectiveness of the film is attributed to the deposit of a high percentage of insoluble, trivalent chrome, as opposed to a lower concentration of soluble, hexavalent chrome.

5 KW Induction Heater

A new 5 KW induction heater, designed for brazing, soldering and laboratory projects, has been announced by the General Electric Company's Industrial Heating Department, Schenectady 5, N. Y.

Effective also for surface hardening and selective annealing applications, the new heater can be adjusted to operate at maximum efficiency with a wide variety of inductor coils up to its full rated capacity. It operates electrically as though it were equipped with a continuously-variable mechanical transmission, according to Company engineers.

Utilization of the new heater is expected to mean considerable savings in investment costs since with the variable transformer coupling feature, a new 5 KW unit can be used in many applications that formerly required a 10 KW or larger heater. By merely turning a crank, the operator can vary work coil current.

Other models are available in the new 5 KW line for applications which don't require a transformer. These are equipped with grid control rectification.

Process Temperatures Transmitted By New Device

A new instrument which measures process temperatures and pneumatically transmits the information to a central recording or controlling station has been announced by The Foxboro Company of Foxboro, Mass. Known as the Model 12A Temperature Transmitter, it is a non-indicating device of the "force balance" type with a calibrated accuracy of ½% of the temperature span and compensated for ambient temperature and barometric pressure variations.

The new transmitter is designed around a gas filled thermal system which exerts force on a flapper-nozzle mechanism in proportion to the measured temperature. The resulting back pressure in the nozzle circuit, amplified through a relay and converted to a force through a bellows, quickly balances out the initial force and constitutes the 3-15 psi output transmitted by low cost tubing to the receiving instrument.

Spans ranging from 50°F. to 400°F. are available and can be utilized between the limits of −100°F. and +1000°F. Three and a half feet of Geon-protected capillary tubing connects temperature bulb to transmitter. A block and clamp mounting arrangement rigidly secures the seven pound instrument to any vertical or horizontal pipe or to a flat surface.

New Armstrong Insulation Division

To provide greater concentration of selling effort on its growing insulation business, the Armstrong Cork Company has created a separate Insulation Division headed by A. E. Pearce as General Sales Manager, effective November 1.

The new Division is composed of two Departments—Industrial Insulation, with J. W. Liddell as Manager; and Equipment Insulation, headed by L. E. Cover.

H. R. Peck, Vice-President and General Manager of the Building Materials Division, announced the Armstrong move, which took the form of creating two new divisions—an Insulation Division, and a Building Products Division—out of the Building Materials Division. The Building Products Division will handle the Company's lumber dealer products and acoustical materials.

Expanded Use Of Rhenium

Research and development on rhenium has brought the metal from obscurity to increasing commercial significance, it was reported by Chester T. Sims, Charles M. Craighead, and Robert I. Jaffee of Battelle Institute, Columbus, Ohio.

Speaking for his associates before a meeting of the American Institute of Mining and Metallurgical Engineers at the National Metals Congress, Chester Sims said that rhenium may soon be found in service as electrical contacts and electron-tube materials. Other potential uses are seen in high-temperature thermocouples and high-wear-resistant

parts such as instrument points.

Previous work on rhenium has been carried out primarily by European scientists. During World War II, it was used by the Germans in an alloy for pen points and thermocouple materials, but other uses were practically unknown.

Sims attributed the increasing importance of rhenium to several factors. First, although only experimental lots are being produced at the present time, it is realized that from ten to twenty thousand pounds could be made available to industry. This is believed to be enough to meet potential future demands.

Even though rhenium is expected to be relatively expensive, its superior properties are sufficient to make its use economically justifiable for highly specialized electrical and electronic applications. Among other properties, it has the second highest melting point of all metals (about 3180 C) and has very high room- and elevated-temperature strength. Though ductile at room temperatures, rhenium hardens, when worked, more than any other pure metal. Unlike tungsten, Sims pointed out, rhenium does not enter into the so-called "water cycle." This phenomenon causes blackening of lamp bulbs with subsequent failure of filaments.

Stamping Design Award

Engineers were urged to submit their entries for the annual John Woodman Higgins Redesign Award before the closing date of December 31, 1954, according to a statement by Carter C. Higgins, president and general manager of Worcester Pressed Steel Company.

The new competition was established recently to honor the individual selected as having done original and outstanding redesign work in the field of metal stamping. A cash prize of $500 dollars will be offered.

Entries should be sent to the John Woodman Higgins Redesign Award, Pressed Metal Institute, 2860 East 130th Street, Cleveland 20, Ohio.

The first Higgins award, according to the statement, will be presented at the spring technical meeting of the Pressed Metal Institute in May, 1955. The presentation will be based on the following criteria: successful production by metal stamping for a part previously turned out by another metal-working process; originality of design; and significant cost savings realized in the changeover to the metal stamping technique.

Nominations for the new annual award will be checked by the Technical Committee of the Pressed Metal Institute and judged by an awards committee composed of leading industrial editors and engineers.

New Model 405 Capacitrol

A new, self-contained, and attractively designed Capacitrol is now being offered by the Wheelco Instruments Division of the Barber-Colman Co., Rockford, Ill. Known as the Model 405, this new instrument is used

News to Heat Treaters (Cont.)

in the control of continuous fuel fired process applications which require a true proportional relationship between fuel input and a continuously measured temperature.

Industrial applications making use of this type controller include heat treating furnaces, bakery or drying ovens, zinc-galvanizing baths, core-baking ovens, ceramic kilns, and melting furnaces.

Using the Wheelco "Electronic Control Principle," the unit incorporates a modified bridge type control circuit. An integral polarized relay, a component of the feed back circuit, is used as the actuator for a fuel valve power unit. Unbalance causes the valve operator to move in a direction to restore the temperature toward the set point and again bring the electrical bridge into balance.

Incorporated in the instrument is means for manual "droop" correction and proportioning band adjustment. Thermocouple break protection, which will automatically shut off fuel input in case of thermocouple failure or broken thermocouple connections, is standard.

Both the temperature measuring system and control chassis are of plug-in design. This feature permits quick removal of either the measuring system or control chassis for easy replacement and servicing without disturbing the instrument or external wiring. The inexpensive vacuum tube used in the control chassis may be purchased from any electronic supply house.

New President Of Park Chemical

At a Board of Directors Meeting on September 24, W. P. Woodside, Jr. was elected President of the Park Chemical Company. Woodside has been associated with Park for the past 18 years as sales representative in the Cleveland territory.

Matthews Appointed Chief Engineer at Fenwal Inc.

Raymond H. Matthews has been appointed chief engineer of Fenwal Inc., Ashland, Mass., manufacturer of precision thermostats, temperature controllers and fire and overheat detectors. He will administer the company's engineering staff which includes a group of 20 engineers and designers now engaged in the development of new instruments to expand Fenwal's product line.

Mammoth Heat Treating Furnace

A car-type heat treating furnace in which a modest one-story bungalow could fit easily has been built by the Westinghouse Electric Corporation.

The furnace has been installed at the East Pittsburgh, Pa., works of Westinghouse and will be used for the stress relieving of large weldments. With a fully usable charge space 30-feet long, 18-feet wide and 16-feet high, single or multiple parts weighing up to 100 tons may be treated at one time.

The furnace was designed for a maximum operating temperature of 1600 degrees F. but stress relieving will be performed at approximately 1175 degrees F.

The front door of the furnace, as well as the floor, rides on 20 car wheels on four parallel railroad type tracks.

Near the top and behind the furnace chamber itself, a refractory-lined combustion chamber is mounted into which four burners with a rating of 7 million Btu's/hr. will fire.

The air passing through the combustion chamber is heated by the burning of gas, and enters the furnace from the rear through ducts suspended from the ceiling. This duct work distributes the heated air through various side openings as it travels toward the front, for uniform heating throughout the charge space.

To complete the cycle, air is drawn out of the furnace through two recirculating blowers having a total circulating rate of 120,000 cubic feet per minute. Duct work then directs the air flow upward to the combustion chamber and thence into the furnace chamber again. Each recirculating fan is powered by a 50 hp motor.

This method of firing and the use of internal duct work prevent hot spots within the charge space and eliminate the need for overhead space above the furnace roof.

Portable Lift

Precision Equipment Co., 3714 N. Milwaukee Ave., Chicago 41, Ill., has announced production of the "Shop Caddy," a two-wheel hand truck which embodies a hydraulic lift capable of raising loads of as much as a quarter ton. The unit is designed for loading and unloading trucks, stacking kegs and boxes, etc. Its lifting platform, in the down position, is at floor level for easy loading. When loaded, a few strokes of the lever will raise the load to the proper height. A four-speed pump ram is furnished as standard equipment so that the lifting speed may be set according to the load.

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New Metal Stop for Metallizing

Manufacturers have found many disadvantages in the use of stop-off paint as a preparatory step to protect certain sections of a part ready for metallizing, according to Park Chemical Co., 8074 Military Ave., Detroit 4, Mich.

Stop-off paints are heavy lacquers not readily adaptable for easy, free flowing applications. They are colorless, which makes it difficult for the worker to distinguish the part to be protected from the part to be sprayed. Also, stop-off paints pose a clean-up problem because they are sticky and not easily cleaned from the containers which are used to hold them.

Aware of this problem, the Park Chemical Co. reports it has developed "Metal Stop" a new product said to eliminate the many disadvantages presented by ordinary stop-off paints.

"Metal Stop" has a gray-white color which readily shows up the part area to be protected. Its edge aligning is very sharp and it is a fast drying paint. Brushing is claimed easier because of free flowing characteristics, and being water soluble, brush cleaning is no problem.

Review of Utility Charges

Impartial audits of utility charges to effect savings for metal treating plants by selecting lowest possible rates, is a service offered by Rateonics Corp., Dallas, Texas.

After operating successfully in this field for 20 years, Rateonics is now expanding nationally and has established Eastern Divisional Offices in New York City, Broadway at 63rd St., N. Y. 23, N. Y. The service is based on the premise that few utility consumers are aware of the number and complexity of electric, gas, water and steam rates on file with the Federal and State Power Commissions and that it is their responsibility, not the utility company's, to select lowest rates. Often, according to Rateonics, utility bills are paid without knowledge of minimum charges

Continuous Standardization

The Bristol Electronic Dynamaster Potentiometer is now available with continuous standardization, according to an announcement by The Bristol Company, Waterbury 20, Conn. The Dynamaster, available in round- and strip-chart models with intermittent automatic or push-button manual standardization, is now offered with a constant voltage source which continuously standardizes the instrument and eliminates dry cells.

The method consists of regulating the output of a dry-disk rectifier to reasonable limits, and floating a standard cell across the load to reduce further the deviations of load value from the required value.

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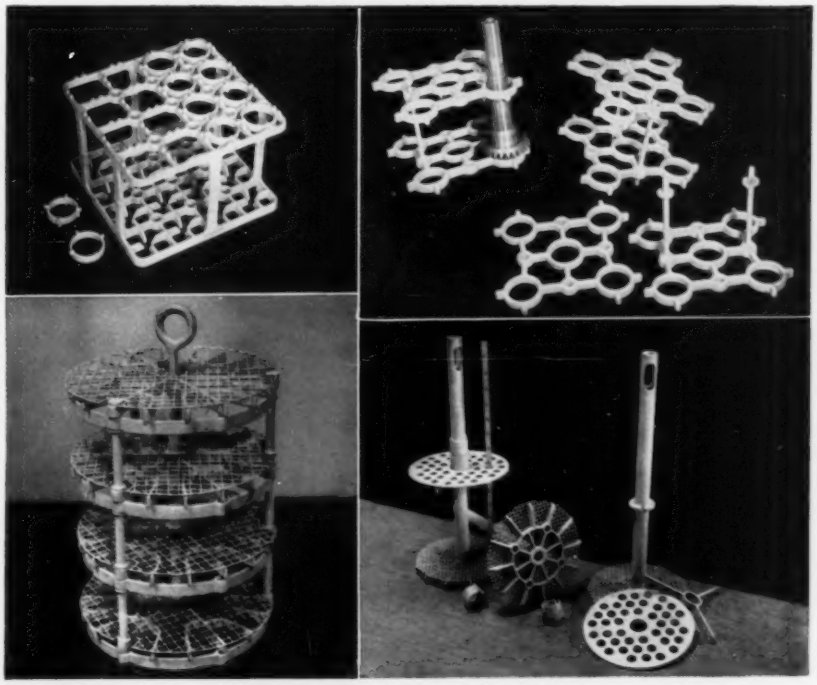

There is a "G.A." Representative located in all principal cities—available at your convenience—to offer engineering counsel and recommendations in connection with your specific heat treating fixture requirements.

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MANUFACTURERS' LITERATURE

The literature listed below contains information of interest to heat treating organizations. For your Copy write direct to the manufacturer and be sure you mention seeing it reviewed in "METAL TREATING".

QUENCH OIL

The Gulf Oil Corp. 1822 Gulf Building, Pittsburgh 30, Pa., recently published a 24 page manual entitled, "Gulf Super-Quench" providing information on the quench characteristics of the oil. It also contains comparative data on a variety of quenching media as they are affected by conditions such as bath temperature and agitation. Included are discussions on the effect of mass, steel hardenability, defects and typical case history stories.

BRISTOL GENERAL BULLETIN

A new general bulletin, DM035, listing and illustrating the complete line of recording automatic controlling, and telemetering instruments manufactured by The Bristol Company, Waterbury 20, Conn. has just been published. The bulletin features the new line of Metagraphic pneumatic transmission instruments, which divide the functions of measuring, recording, and controlling into three separate instruments to achieve maximum flexibility in application.

ROTOBLAST BARRELS

Pangborn Corporation, Hagerstown, Md., has announced the publication of Bulletin No. 226 which describes the various models of Continuous-Flo Rotoblast barrels available for production line blast cleaning of parts of all types.

These machines are able to handle a continuous flow of work coming from the preceding operation, castings from the shakeout, forgings from heat treatment or stampings from the presses.

HEAT TREATING MEEHANITE

"How Heat Treating Improves Modern High Strength Irons" is the subject of a booklet available from Meehanite Metal Corp., New Rochelle, N. Y. It offers numerous tables and graphs illustrating the effects of various heat treatments as well as case history data on heat treated Meehanite parts.

GENERAL INSTRUMENTATION CATALOG

A new 12-page general catalog with illustrations, descriptions, and basic specifications of Fischer & Porter Company's complete line of process instrumentation is now available from the company at 172 Jacksonville Rd., Hatboro, Pa. Instrumentation for measuring and controlling process variables includes: Variable-area and variable-head flow meters; pressure instruments; temperature instruments; liquid level instruments; density and specific gravity measuring instruments; viscosity and consistency instruments; electric, pneumatic, and electronic transmitting, recording and controlling instruments with alarms and integrators; and air-operated control valves in various models and construction materials.

CLEANING HINTS

American Wheelabrator and Equipment Corp., Mishawaka, Ind., has announced the publication of "Wheelabrator Tips," the first in a series of service bulletins. The series is designed to provide hints and useful technical information on blast cleaning.

ALLOY CAST IRONS

Bulletin A-115 entitled Heat Treatment Fundamentals of Nickel Alloy Cast Irons is being distributed by The International Nickel Company, Inc., New York 5, N. Y. It offers information on how to increase the usefulness of cast irons and improve the properties by alloying and heat treatment. For easy understanding a glossary of terms is included.

WELDING PREHEAT

"Preheating for Welding," an article by A. B. Tesmen which appeared originally in the April 1952 issue of the Welding Journal is available from Tempil Corp., 132 W. 22 St., New York 11, N. Y. It reviews welding procedures which have been found to produce crack free joints under a variety of conditions.

TRAYS, BOXES, AND FIXTURES

Industrial furnace tray, box, and fixture designs are featured in a four-page bulletin, No. 6, by Standard Alloy Company, Inc., 1679 Collamer Rd., Cleveland 10, Ohio.

Many heat resisting cast alloy fixture assemblies offer quick and easy loading of pieces with minimum point contact. These designs are said to be particularly adaptable to the supporting of gears and similar pieces to be heat treated on a production basis.

Standard heat and corrosion resisting cast alloys, recommended for furnace trays, boxes, and fixtures are tabulated together with the respective composition, maximum temperatures, and atmosphere effects.

SALT BATHS

Ajax Electric Co., 940 Frankford Ave., Phila., Pa., has just published a four page bulletin entitled "Salt Bath Success Stories" which lists and provides an abstract of technical articles on salt bath processes. The folder offers a considerable amount of technical literature on subjects such as austempering, brazing, carburizing, cyaniding, hardening, etc. Copies of papers may be obtained upon request to the company using an enclosed order form.

SAVINGS IN UTILITY CHARGES

Savings on electric, gas, water and steam bills for commercial and industrial firms, is the subject of a 20-page booklet issued by Rateonics Corporation, P. O. Box 239, Dallas, Texas, independent utility rate auditing organization. "The Rateonics Story" states that many business men pay utility bills without knowledge of minimum rates, metering or billing procedure.

HIGH VELOCITY OIL BURNERS

Bulletin #107 on Thermal high velocity oil burners is now available from Thermal Research and Engineering Corp., Conshohocken, Pa. It contains complete information including operating principles, applications, dimensions and output data. These burners are reported particularly well suited for use in furnaces, ovens and dryers, kilns and in numerous specialized applications.

FUEL-AIR RATIO CONTROL

Details about fuel-air ratio control are given in two data sheets now available from Leeds & Northrup Company, 4934 Stenton Ave., Phila., Pa. Sheet ND69(1) describes the equipment for all-electric operation; sheet ND69(11) describes the Controller for pneumatic operation.

MICROCARB ATMOSPHERE CONTROL

"Microcarb Atmosphere Control for Control of Carbon Potential in Homocarb Furnaces" is the subject of a new 12-page catalog just published by Leeds & Northrup Company, 4934 Stenton Ave., Phila. 44, Pa.

In a graphic manner it explains the principle and operation of this method for continuous, automatic measurement and control of active carbon inside the furnace retort during heat treating cycles.

AIRBLASTING AND SANDBLASTING NOZZLES

A new catalog, No. 27-A, describing its line of airblast cleaning nozzles has been published by American Wheelabrator & Equipment Corp., 1175 South Byrkit St., Mishawaka, Indiana. Three standard models of nozzles are described. Also included are pressure blast hose fittings for standard airblast nozzles.

Of special interest to cleaning engineers is the description of materials employed in the nozzles, and the discussion of how to control compressed air consumption. This is accompanied by tabular data showing the importance of controlling nozzle wear.

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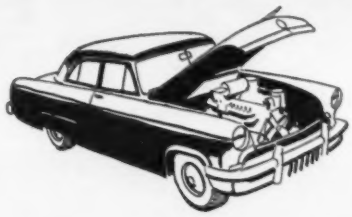

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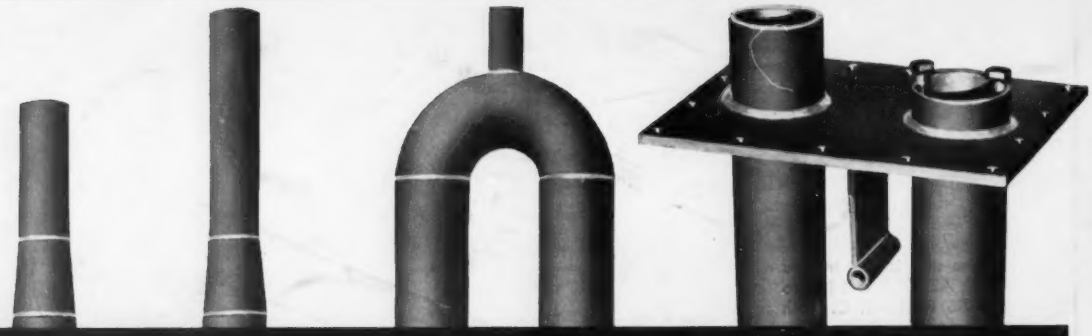

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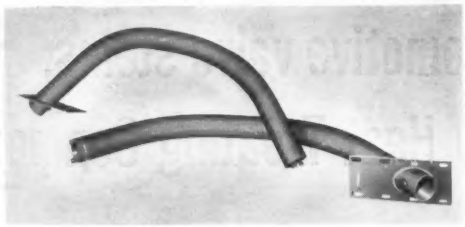

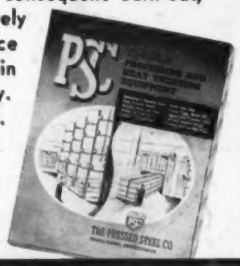

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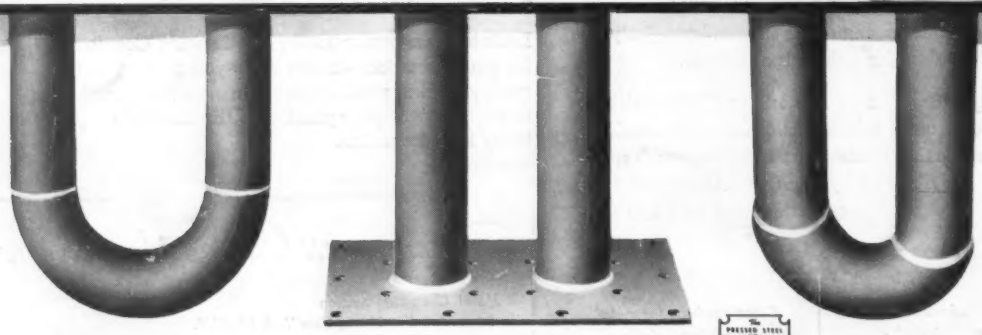

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